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BIRNEY-DECKER WILDLIFE
STUDY
FINAL REPORT



RESEARCH CONDUCTED BY
MONTANA DEPARTMENT OF
FISH AND GAME

SPONSORED BY
BUREAU OF LAND MANAGEMENT

PREPARED BY

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INTRODUCTION

With the increasing interest in developing coal by strip mining in eastern Montana, it became necessary for the Bureau of Land Management to study the subject areas under consideration for coal leasing to gather additional and intensified wildlife resource data. These subject areas were determined through the Bureau's Planning System.

The planning for the Decker-Birney Planning Unit was completed on 898,709 acres in 1974. The various stages in the planning system require inventories by each resource category, preliminary resource recommendations and alternatives, and public reviews and meetings, with the last stage to develop management guidelines for all resource activities.

The recommended potential coal leasing areas were delineated after all known critical resource values, recommendations, and resource impacts were superimposed over the total strippable coal areas in the planning unit. These resource conflicts were then resolved by elimination or conditioning the recommendations.

After the process of evaluating these recommendations, seven areas were determined to have the least amount of conflicts between surface resources and coal development. These seven potential coal leasing areas were Ashland, Otter Creek, Moorhead, Hanging Woman, Decker-Kirby, and Birney. For purposes of the wildlife study, the Otter Creek and Moorhead areas were combined into the Upper Otter Creek area and the Kirby and Birney areas were combined as the Canyon Creek area.

It was also determined through the planning system that data gaps existed for wildlife and intensified inventory studies are needed for proper evaluations of coal leasing in these defined areas. To acquire wildlife resource information, a two year contract was entered into with the Montana Department of Fish and Game in July 1974.

The objectives of the contractual agreement were:

- (1) To develop techniques to quantify the fish and wildlife resources, including game and nongame species, either directly or through habitat quality and population productivity indices to allow reasonable predictions to be made on the effect of development on the fish and wildlife resource.



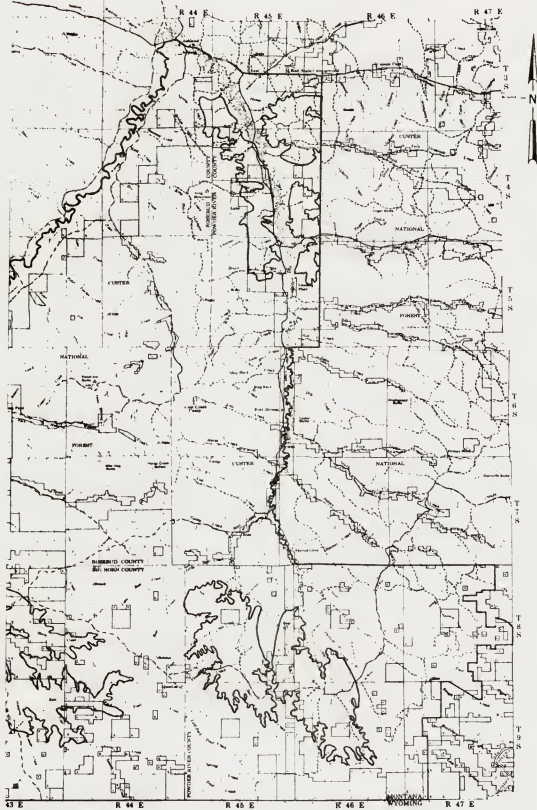
Figure 1. Study area with five potential coal lease areas.

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R 44 E

BIRNEY-DECKER PLANNING UNIT

MILES CITY DISTRICT MONTANA



(2) Ascertain key ecological requirements of fish and wildlife resources to provide a basis for reclamation and revegetation guidelines.

(3) To develop plans and procedures for mitigating and/or compensating any loss of wildlife or habitat through the surface mining process.

STUDY AREA

Location

The Birney-Decker area encompasses about 900,000 acres in southeastern Montana (figure 1). It is bordered on the north by the Northern Cheyenne Indian Reservation and the town of Ashland, on the east by the Otter Creek drainage, on the south by the state of Wyoming, and on the west by the Crow Indian Reservation. The area includes portions of Bighorn, Powder River and Rosebud Counties, a part of the Custer National Forest and BLM land. Private ownership holds 69 percent of the land, Forest Service 17 percent, BLM 9 percent and the state 5 percent (Decker-Birney Resource Study 1973). The principal use of the area is for livestock production. The human population is approximately 1000. The communities within the area are Ashland, Birney, Decker, Kirby, Quietus and Otter.

The five potential coal lease areas in figure 1 were arrived at by the BLM after much deliberation. The lease area in the northeast corner of the Birney-Decker area is the Ashland coal lease, named after the nearby town of Ashland. The area in the southeast corner is in the same drainage and therefore named after the drainage as the Upper Otter Creek lease. The area in the lower center of figure 1 is divided by Hanging Woman Creek and named after it. The fourth area, surrounding the Tongue River Reservoir is named after the nearby town of Decker. The fifth area, in the northwest portion of the study area is named after one of its major drainages, Canyon Creek. The majority of the wildlife work was done within the boundaries of these lease areas, since this is where the major impact of any development would be felt. Some wildlife observations were recorded if adjacent to a lease area or along the Tongue River.

Physiography

Important physical features within the area include the Tongue River, Rosebud Creek and Otter Creek drainages which

generally dissect the region in a south/north direction, King Mountain, Poker Jim Butte, Wild Hog Butte and Horse Creek Butte which are situated in the northeastern part of the area, and the Tongue River Reservoir which is located in the southwestern portion of the unit. The lowest elevation, about 2,900 feet, is found adjacent to the Tongue River near Ashland, while the highest point of 4,300 feet, lies approximately 40 miles to the south along the Montana/Wyoming stateline (Decker-Birney Resources Study 1973).

The surface geology is the Tongue River member of the Fort Union formation. It consists of nearly level bedded, weakly consolidated soft sandstones, silty sandstones, clay shales and coalbeds. Large areas of the coalbeds have burned and the heat has baked and oxidized adjacent shale beds, resulting in brittle, reddish iron-oxide colored porcellanite (locally called scoria) and clinker beds. The Fort Union formation is of early Tertiary or Paleocene age, deposited about 60 to 80 million years ago. It was deposited by freshwater streams from highland sources to the west. Petrified trees, leaf fossils and shells of mollusks are common in some strata.

Terrace deposits of Quaternary age, one million to less than 25,000 years old, are common along major drainages. The soft shales and sandstone of the Fort Union formation are readily eroded in the semi-arid climate. This has resulted in intricately dissected plateau topography with a complex of high and intermediate bench levels. Common on the landscape are badlands, sandstone and shale escarpments and scoria buttes with highly irregular topography. South-facing slopes have, as a rule, more exposure of shale and sandstone, and a larger number of drainages. The overall area has a rough and broken topography with prominent high benches at several levels on the landscape.

Climate

The climate is characterized by cold winters and warm summers, with a frost-free period of approximately 105 days (U.S. Forest Service 1971). Mean annual precipitation ranges from 11-16 inches. May and June are normally the months of greatest precipitation (Appendix table 1).

METHODS

Most big game habitat use and distribution data were gathered by observations from a plane. In this manner about half of each lease area could be covered uniformly and

entirely in only 2-3 hours. This reduced bias which could be introduced either by inaccessible land due to rugged topography, or land that was closed to trespass. Each big game animal was classified by sex, age, and activity when possible. The area occupied by the animals was classified as to vegetation type and subtype. The location of each observation of deer and antelope was plotted on a planimetric map. An observation usually represents more than one animal.

Observations were grouped by seasons. Fall was September through November; winter, December through February; spring, March through May; and summer, June through August. Since animals habits such as distribution, habitat use and food preferences change with the seasons rather than by the month it is much more logical to group observations in this manner.

I tried to fly each lease area twice during each season for the two years but this was modified at times due to weather, availability of a plane and scheduling of other activities.

Some of the lease areas were flown in a north-south direction with about a mile between flight lines. This seemed sufficient for the open prairie but in the timbered breaks it was often necessary to fly closer lines, at about 1/2 mile intervals. In the Canyon Creek lease area it was not possible to fly north-south lines due to the terrain; therefore, the parallel drainages and divides were followed.

Most of the flights were made flying fixed-wing aircraft, models PA 11 or a J 3 at 200-400 feet above ground level.

In spring sharptail grouse dancing grounds and sage grouse strutting grounds were located by plane. The number of birds per ground was counted. If possible the grounds were re-checked by driving to them.

The Canada goose breeding pair survey, the reconnaissance of a nesting osprey, and great blue heron and cormorant rookeries were carried out from a plane.

Small game inventory, additional big game observations and any other wildlife observations (predators, furbearers, raptors, nongame) were carried on from a four-wheel drive vehicle. In general, no set routes were used for the observations obtained from the four-wheel drive. The lease areas were covered about once every two weeks.

A songbird census route was run on Otter Creek in the Ashland lease in spring of 1975. The species, number, and location was recorded along a 13 mile route. The only practical use of such a census would be gross relative changes in major species population from year to year.

The plant community descriptions in table 1 were obtained by running twenty 2x5 decimeter plots in representative stands of the plant communities under investigation. Species constancy, canopy coverage, and frequency were recorded. Altogether 41 series of these twenty 2x5 decimeter plots were run. These sites were on the Custer National Forest and were established in the summers of 1970 and 1971 (Knapp 1972). However, these appear to be very representative of the major vegetation communities found in the coal lease areas under investigation.

Aerial photos on a scale of 1:40,000 were used to determine acreage of major plant communities. A planimeter was employed to calculate acreages right off the photos and adjusted to scale. The reason for calculating these acreages is to see if there was any preference use of certain habitats by deer and antelope. This is done by dividing the percentage of the total observations in a certain vegetation type by the percent acreage of that type. The resulting number is called a Habitat Preference Index (HPI). The larger the index the more preference this indicates. However, the number of big game observations and the acreage of the vegetation type have to be taken into consideration. A small type could receive a large index and appear to have importance far beyond its real value. This preference index is useful in that it provides a quantitative method for determining relative use of major habitats.

RESULTS

Vegetation

The vegetation of the study area was divided into three major habitat types. Each of these types was further divided into subtypes (table 2). The three broad vegetation/habitat types give an idea of the general type of ecosystem the wildlife species inhabit, but the subdivisions of each major habitat type give a more definitive aspect of wildlife requirements from season to season. Table 2 gives quantitative data for seven major subtypes within the three habitat types. These subtypes cover the majority of the area and floral variety (Knapp 1976). The other subtypes can be discerned from their titles and/or qualitative description.

Table 1.

CONSTANCY, PERCENT CANOPY COVERAGE AND FREQUENCY OF LOW-GROWING TAXA FOR VEGETATION TYPES AS DETERMINED BY EXAMINATION OF TWENTY 2x5 DECIMETER PLOTS ON EACH OF 41 SITES.

Taxa ¹	Grassland Park Type 11 Sites	Ponderosa Pine Type 6 Sites	Blue-Grass Type 5 Sites	Creek Bottom Type 5 Sites	Grassland Type 8 Sites	Big Sage-Grassland Type 4 Sites	Grassland Type 3 Sites
GRASS AND GRASS-LIKE PLANTS:							
<i>Agropyron amabilis</i>	73/9/50 ²	83/5/35	80/4/16	25/tr/1	100/10/68	75/17/54	100/17/77
<i>Agropyron aptatum</i>	27/2/10	50/5/21	60/3/19	25/3/13	13/tr/3	50/0/38	--
<i>Agropyron spp.</i>	9/2/9	--	--	25/3/2/9	--	--	--
<i>Andropogon gerardii</i>	27/1/5	67/18/41	--	25/tr/1	38/6/15	--	--
<i>Andropogon scoparius</i>	--	17/1/4	--	--	13/1/3	--	--
<i>Aristida longifolia</i>	18/tr/1	17/tr/1	20/1/1	--	13/tr/1	--	--
<i>Bouteloua curtipendula</i>	45/5/14	83/9/30	80/7/23	--	38/2/13	25/7/20	--
<i>Bouteloua gracilis</i>	64/3/14	--	20/1/4	--	88/7/34	75/22/41	33/5/15
<i>Bromus japonicus</i>	73/5/26	50/4/18	40/5/17	25/tr/1	75/15/23	75/17/43	67/16/65
<i>Bromus tectorum</i>	55/24/45	33/tr/6	100/34/75	25/1/6	25/1/3	50/11/24	67/7/27
<i>Carex filiformis</i>	--	17/1/3	20/1/6	--	13/tr/1	--	--
<i>Carex spp.</i>	73/9/47	83/9/47	20/2/5	50/5/23	100/27/84	--	--
<i>Elymus cinereus</i>	--	--	25/1/3	--	25/1/3	--	--
<i>Festuca idahoensis</i>	36/4/14	83/19/60	20/7/13	50/12/30	38/7/25	--	--
<i>Festuca ovina</i>	9/tr/1	--	--	--	13/tr/2	50/1/6	33/3/3
<i>Koeleria cristata</i>	55/3/23	83/3/23	40/1/6	75/2/9	100/8/59	50/3/20	67/9/33
<i>Poa annua</i>	64/5/36	33/tr/8	40/1/1	25/1/6	63/6/43	25/1/10	33/tr/2
<i>Poa spp.</i>	9/6/9	--	--	--	75/10/36	50/4/19	33/12/12
<i>Stipa comata</i>	55/5/24	100/8/37	60/6/30	--	100/5/28	50/2/16	100/18/50
<i>Stipa viridula</i>	64/4/23	83/5/23	--	100/8/34	100/5/28	--	--
Unidentified Grass	9/tr/1	17/6/13	20/tr/2	100/29/60	13/tr/1	--	--
Total Grass and Grass-Like	100/87/99	100/93/98	100/73/98	100/64/100	100/104/99	100/68/98	100/73/100
FORBS:							
<i>Arnica montana</i>	55/2/14	83/3/26	40/1/6	75/3/25	38/2/9	25/tr/5	33/3/33
<i>Antennaria artemisiifolia</i>	73/9/47	50/1/14	80/2/18	--	63/2/19	--	--
<i>Antennaria parvifolia</i>	18/1/6	33/2/14	--	--	63/2/13	50/tr/3	--
<i>Antennaria dioica</i>	18/tr/1	18/tr/1	20/1/2	25/tr/1	13/tr/1	--	--
<i>Antennaria frigida</i>	51/1/10	17/tr/2	40/1/6	25/tr/3	63/2/16	73/1/13	33/5/15
<i>Antennaria ludoviciana</i>	45/2/15	83/6/26	20/1/4	50/5/23	75/5/22	25/tr/1	--
<i>Aster oblongifolius</i>	50/19/19	83/5/19	50/2/16	75/2/16	50/1/14	--	--
<i>Aster occidentalis</i>	--	--	--	25/1/8	--	--	--
<i>Aster spp.</i>	--	33/8/8	--	--	--	--	--
<i>Chamaenerion angustifolium</i>	9/tr/1	--	--	50/3/13	--	--	--
<i>Chrysopsis villosa</i>	9/1/4	--	--	--	--	--	--
<i>Collinsia leucantha</i>	--	33/tr/7	--	--	13/tr/1	--	--
<i>Cruciferae</i>	36/1/5	17/1/5	20/tr/2	--	13/tr/1	50/1/19	--
<i>Euphorbia lasiocoma</i>	--	--	25/tr/3	--	--	25/1/5	--
<i>Gnaphalium</i>	64/1/10	50/1/5	20/tr/1	--	88/1/18	--	33/tr/3
<i>Gum triflorum</i>	--	33/tr/3	--	25/1/4	--	--	--
<i>Glycyrrhiza lepidota</i>	--	17/1/8	--	--	13/tr/1	--	--
<i>Oenothera biennis</i>	9/tr/2	17/tr/1	--	25/tr/1	38/2/8	50/6/34	--
<i>Helianthus uniflorus</i>	--	17/1/4	--	--	--	--	--
<i>Hesperis matronalis</i>	9/1/3	--	--	--	--	--	--
<i>Lactuca scariola</i>	27/3/16	17/tr/3	60/tr/7	--	--	--	--
<i>Lappula pedunculata</i>	9/tr/1	33/tr/3	20/1/4	--	--	--	--
<i>Limon perenne</i>	18/tr/1	33/tr/3	20/1/5	25/tr/1	--	--	--
<i>Lupinus spp.</i>	18/1/3	50/tr/3	--	--	13/tr/3	--	--
<i>Lythrum salicaria</i>	--	33/tr/3	20/tr/2	--	13/tr/1	25/1/5	33/1/10
<i>Monarda fistulosa</i>	--	--	25/1/1	--	--	--	--
<i>Monarda purpurea</i>	27/1/5	--	--	25/1/3	--	--	--
<i>Petalostemon</i>	27/tr/3	33/2/7	--	13/tr/1	--	--	--
<i>Phlox hoodii</i>	45/3/19	17/1/3	--	50/tr/3	63/2/10	75/6/28	--
<i>Phlox longifolia</i>	36/2/16	33/2/18	20/1/8	50/1/5	13/2/13	28/1/5	--
<i>Phlox pilularis</i>	45/2/15	50/1/13	--	63/4/13	--	--	--
<i>Phlox subulata</i>	18/tr/1	--	--	--	25/1/7	--	--
<i>Rubus</i>	18/tr/1	--	50/1/5	--	13/tr/1	--	--
<i>Sagittaria arifolia</i>	9/1/2	--	40/1/8	--	--	--	33/6/20
<i>Spharalea obovata</i>	45/1/9	33/tr/8	60/1/9	--	100/4/40	50/tr/10	67/1/18
<i>Thymus</i>	9/tr/1	--	--	13/tr/1	--	33/1/18	--
<i>Thymus dubius</i>	27/tr/4	33/tr/4	40/tr/3	25/tr/1	38/tr/5	25/tr/1	33/tr/2
<i>Thymus glauca</i>	9/1/1	--	--	--	25/1/1	--	--
Unidentified Forbs	45/1/5	50/1/5	40/tr/4	75/2/14	25/tr/2	25/tr/2	33/tr/2
Total Forbs	100/38/84	100/30/89	100/15/60	100/20/75	100/33/67	100/18/49	100/17/68
SHRUBS:							
<i>Artemisia cana</i>	--	--	--	50/3/15	13/tr/3	22/tr/5	33/tr/2
<i>Artemisia tridentata</i>	--	--	20/tr/1	--	--	75/6/28	--
<i>Berberis repens</i>	--	17/tr/1	--	50/2/13	--	--	--
<i>Bromus pinnatus</i>	--	33/2/5	--	25/1/1	--	--	--
<i>Prunus virginiana</i>	9/tr/1	--	--	100/9/54	--	--	--
<i>Rosa arkansana</i>	45/1/9	67/3/17	--	100/15/65	38/1/7	25/tr/1	--
<i>Rosa mollis</i>	--	--	--	25/1/5	--	--	--
<i>Rosa trilobata</i>	45/4/8	50/2/4	100/23/42	100/11/19	--	--	--
<i>Rubus cuneatus</i>	--	--	--	50/1/8	--	--	--
<i>Rubus odoratus</i>	--	--	--	25/1/4	--	--	--
<i>Symphoricarpos</i>	27/tr/4	50/5/24	--	75/13/53	13/tr/6	--	--
Total Shrubs	64/5/19	67/12/38	100/23/42	100/61/91	38/1/11	100/5/51	33/tr/2
BARF GRASS:	91/17/77	100/9/59	80/9/35	100/10/36	100/10/80	100/12/61	100/21/63

¹Includes those taxa with a canopy coverage of .5 percent or greater or a frequency of .5 percent or greater in at least one type. Others are listed in Appendix.

²Constancy (percent occurrence among sites)/canopy coverage (percent of area covered)/average frequency (percent occurrence among plots).

tr = trace; - = value less than .5 percent.

Table 2. Habitat Types and Subtypes.

Ponderosa Pine Type	Grassland Type	Big Sage-Grassland Type
<u>Subtypes</u>	<u>Subtypes</u>	<u>Subtypes</u>
Ponderosa Pine	Grassland	Big Sage-Grassland
Grassland Park	Big Sage-Grassland	Grassland
Rhus-Grassland	Rhus-Grassland	Deciduous Shrub
Deciduous Shrub	Roadside	Silver Sage
Big Sage-Grassland	Alfalfa Field	Juniper
Ponderosa Pine-Juniper	Grain Field	Roadside Vegetation
Roadside Vegetation	Silver Sage	Alfalfa Field
Silver Sage	Pasture	Grain Field
Alfalfa Field	Ponderosa Pine	Pasture
Grain Field	Greasewood	Greasewood
Pasture	Deciduous Shrub	Ponderosa Pine
Snowberry Patch		Big Sage-Juniper
Ponderosa Pine-Juniper-		Ponderosa Pine-Juniper
Big Sage Mix		Rhus-Grassland
Juniper		

Ponderosa Pine Type

This type is found around the edge of plateaus, extending down into coulee heads and along divides, especially north slopes. This type was divided into 14 subtypes.

Ponderosa Pine Subtype

The overstory is ponderosa pine varying from a dense canopy with little understory to doghair thickets to extremely sparse, savannah-like coverage. Important shrubs are snowberry (*Symphoricarpos* spp.) and rose (*Rosa arkansana*) in the mesic coulee heads and skunkbush sumac (*Rhus trilobata*) which becomes more prevalent in the sparse pine stands. Major forbs include yarrow (*Achillea millefolium*), cudweed sage (*Artemisia ludoviciana*) several asters (*Aster* spp.) and scarlet gaura (*Gaura coccinea*). This type had one of the most varied forb composition of any type. The most common grasses are Idaho fescue (*Festuca idahoensis*), sedge (*Carex* spp.), side-oats grama (*Boutelous curtipendula*), needle and thread (*Stipa comata*), green needlegrass (*Stipa viridula*), bluebunch wheatgrass (*Agropyron spicatum*) and western wheatgrass (*Agropyron smithii*). (Table 2) (Figure 2)



Figure 2. Ponderosa pine subtype within the ponderosa pine habitat type.



Figure 3. Grassland park subtype within the ponderosa pine habitat type.



Figure 4. Rhus-grassland subtype within the ponderosa pine habitat type.



Figure 5. Deciduous shrub subtype with alfalfa field subtype in foreground, and ponderosa pine subtype in background. All are within the ponderosa pine habitat type.

Grassland Park Subtype

The open parks within the pine forest occur on plateau tops and gently sloping sidehills. This type is as varied in floral composition as the ponderosa pine subtype. The only major shrub is skunkbush sumac. Rose is sparsely scattered throughout the type. Prevalent forbs are ragweed (*Ambrosia artemisiifolia*) wild lettuce (*Lactuca serriola*), Hood's phlox (*Phlox hoodii*), scarlet globemallow (*Sphaeralcea coccinea*) and silverleaf scurfpea (*Psoralea argophylla*). The important grasses are western wheatgrass, Japanese chess brome (*Bromus japonicus*), downy chess brome (*Bromus tectorum*), sedge, bluegrasses (*Poa* spp.) green needlegrass, needle and thread and side-oats grama. (Table 2) (Figure 3).

Rhus- Grass Subtype

This type is found on gentle-to-steep slopes. The only significant shrub is skunkbush sumac. Forbs are rather scarce except for occasional local concentrations. Ragweed and soapweed (*Yucca glauca*) are the predominant forbs. The more prevalent grasses are downy chess brome, Japanese chess brome, side-oats grama, Idaho fescue and needle and thread. (Table 2) (Figure 4).

Deciduous Shrub Subtype

Cottonwood (*Populus deltoides*) and green ash (*Fraxinus pennsylvanicus*) are dominant trees. Serviceberry (*Amelanchier alnifolia*), snowberry and rose are the most prevalent shrubs with skunkbush and chokecherry (*Prunus virginiana*) being fairly common. Forbs and grasses vary with the type of creek bottom where most of this type is located. (Table 2) (Figure 5).

Big Sagebrush-Grassland Subtype

This subtype is found on steep slopes and in small parks scattered throughout the ponderosa pine. The dominant shrub is big sagebrush. Major forbs are fringed sagewort (*Artemisia frigida*), Hood's phlox and snakeweed (*Gutierrezia sarothrae*). Prominent grasses are western wheatgrass, blue grama (*Bouteloua gracilis*), downy brome and Japanese brome.

Ponderosa Pine-Juniper Subtype

This type is often an ecotone between the ponderosa pine

type and the big sage-grassland type. Rocky Mountain juniper (*Juniperus scopulorum*) grows on rough, rocky breaks down into the coulee bottoms. Various degrees of association exist between shrubs, forbs and grasses within this subtype. Within the ponderosa pine type, juniper is in association with and dominated by ponderosa pine. Understory plants are skunkbush, soapweed, Hood's phlox, asters, scarlet gaura, scarlet globemallow, bluebunch wheatgrass and green needlegrass. Further down the ridges and coulees, juniper gains in abundance and in places occurs as almost pure stands. Understory vegetation is sparse. At the lower end of this ecotone, juniper is found in association with big sagebrush and other species such as fringed sage, Hood's phlox, snakeweed, blue grama, western wheatgrass and bluebunch wheatgrass (Figure 6).

The limits of this ecotone are ill-defined due to patches of juniper occurring on favorable exposures extending up into the pine type or down into the sage-grassland.

Silver Sage Subtype

Areas of silver sage (*Artemisia cana*) are usually linked to mesic sites such as floodplains, coulees and sidehill benches (Figure 7).

Roadside Subtype

A mixture of pioneering forbs that grow on disturbed areas make up this subtype. It provides an abundance of food for seed-eating birds and cover for birds that utilize the roads looking for insects or picking up grit (Figure 8).

Snowberry Patch Subtype

Snowberry is an important fall food for deer and at that time of year is used rather extensively. Since snowberry is also a couple of feet high, it may be used by a doe to have her fawn and/or hide one while it is young.

Ponderosa Pine-Juniper-Big Sagebrush Mix Subtype

This subtype was arbitrarily placed under the ponderosa pine habitat type although it is often an ecotone. The title implies that there is a relatively even distribution of pine, juniper and sagebrush. There is too much sagebrush for this subtype to be classified as pine-juniper and the sagebrush is not limited to pockets within the woodland but dispersed throughout it (Figure 9).



Figure 6. Ponderosa pine-juniper subtype within the ponderosa pine habitat type.



Figure 7. Silver sage subtype in foreground. Snowberry patch subtype in midground on edge of ponderosa pine habitat type.



Figure 8. Roadside vegetation subtype within ponderosa pine habitat type.



Figure 9. Ponderosa pine-juniper-big sagebrush mix subtype.

Juniper Subtype

This subtype is comprised of patches of pure juniper (Figure 10).

The remainder of the ponderosa pine habitat subtypes are self-explanatory by title.

Grassland Type

This type occurs mainly in the tops of plateaus, and sometimes as part of valley floors. It has been divided into eleven subtypes.

Grassland Subtype

The major grass species are western wheatgrass, little bluestem (*Andropogon scoparius*), blue grama, Japanese brome, sedge, Idaho fescue, junegrass (*Koeleria cristata*), Sandberg bluegrass (*Poa secunda*), needle and thread, and green needlegrass. Some of the more common forbs are cudweed sage, scarlet globemallow, silverleaf scurfpea, yarrow, ragweed and pussytoes (*Antennaria parvifolia*). Rose was the only shrub of any significance. (Table 2) (Figure 11).

Greasewood Subtype

This subtype is composed of small areas of greasewood (*Sarcobatus vermiculatus*).

The remainder of the subtypes have been described under the ponderosa pine subtypes.

Big Sagebrush-Grassland Type

This type occurs mainly in the southern part of the Birney-Decker area at the head of Tongue River, Hanging Woman and Otter Creeks and the land in between. This type also occurs on the floodplains of major drainages and steep, south-facing, scoria slopes (table 2) (figure 12). It has been divided into 14 subtypes.

The major subtypes have been described.



Figure 10. Juniper subtype in background on hill.



Figure 11. Grassland subtype of the grassland habitat type.



Figure 12. Big sagebrush habitat type.

Acreages of Prominent Habitat Subtypes from Aerial Photos

Tables 3-7

For classifying wildlife as to habitat use, table 2 was developed to be as specific as possible. But for determining acreage from aerial photos only the subtypes that could be discerned are listed in the following tables 3-7. The categories farming and irrigated are used. Farming refers to grain fields and irrigated to alfalfa fields. These prominent vegetation communities more closely follow BLM plant code listings and are drawn out on the animal distribution maps, figures 13-35 and 38-42.

Table 3. Acreage of prominent habitat subtypes (BLM plant code) in the Ashland coal lease area.

Subtypes	Plant Code	Acres	Percent of Total
Farming (Dry)	F	475	<1
Irrigated	I	3,799	7
Ponderosa Pine	6	8,644	16
Ponderosa Pine/Juniper	6/9	5,325	10
Juniper	9	590	1
Big Sage-Grassland	4	22,975	43
Big Sage-Grassland Parks	4	459	<1
Grassland	1	9,849	18
Grassland Parks	1	1,447	3
Deciduous Trees	10	174	tr
		53,737	100

Table 4. Acreage of prominent habitat subtypes in the Upper Otter Creek coal lease area.

Subtypes	Plant Code	Acres	Percent of Total
Ponderosa Pine/Juniper	6/9	1,997	3
Ponderosa Pine	6	7,425	13
Big Sage-Grassland	4	32,427	56
Farming (dry)	F	1,265	2
Irrigated	I	1,930	3
Grassland	1	12,920	22
		59,964	99

Table 5. Acreage of prominent habitat subtypes in the Hanging Woman coal lease area.

Subtypes	Plant Code	Acres	Percent of Total
Grassland	1	10,318	17
Grassland Parks	1	206	tr
Ponderosa Pine	6	5,520	9
Ponderosa Pine/Juniper	6/9	6,577	11
Juniper	9	76	tr
Farming (Dry)	F	2,049	3
Big Sage-Grassland	4	36,185	58
Big Sage-Grassland Parks	4	441	1
Irrigated	I	911	2
		62,283	101

Table 6. Acreage of prominent habitat subtypes in the Decker Coal lease area.

Subtypes	Plant Code	Acres	Percent of Total
Grassland	1	3,896	9
Grassland Parks	1	16	tr
Juniper	9	3,264	7
Ponderosa Pine/Juniper	6/9	1,166	3
Ponderosa Pine	6	1,686	4
Farming (Dry)	F	1,447	3
Irrigated	I	706	2
Big Sage-Grassland	4	31,149	70
Big Sage-Grassland Parks	4	108	tr
Broadleaf	10	821	2
		44,259	100

Table 7. Acreage of prominent habitat subtypes in the Canyon Creek coal lease area.

Subtypes	Plant Code	Acres	Percent of Total
Ponderosa Pine	6	10,682	18
Juniper	9	1,374	2
Ponderosa Pine/Juniper	6/9	18,448	31
Grassland	1	15,598	26
Farming (Dry)	F	482	1
Big Sage-Grassland	4	12,025	20
Broadleaf	10	589	1
		59,198	99

Ashland Coal Lease Area

Mule Deer

Use of Habitat Types

Fall: During both autumns the grassland subtype appeared to be utilized the heaviest, 37 and 53 percent respectively (Table 8). These percentages are probably higher than actual use, since there is always bias in trying to relate wildlife use to plant communities. Deer are usually observed early in the morning or in the evening when they are feeding and moving; therefore, most observations are associated with periods and places of activity. Many of the deer observed on the grassland subtype were moving from alfalfa fields to the forest. The actual use of the alfalfa fields and forest was probably underrated. The use of the ponderosa pine type is most often underrated because this is the most difficult vegetation in which to see deer. (Figure 13)

As can be seen from table 8 there is some difference between habitat type usage for the two years. During 1974 the Ponderosa Pine Habitat Type and the Grassland Habitat Type each accounted for 40 percent of the observations, but in 1975, 91 percent of the observations were in the Grassland Habitat Type. Much of this difference is because in 1974 two flights were made, early October and late November, but in 1975 only one flight was made and this was in mid-October. The later flight in 1974 accounted for most of the Ponderosa Pine Habitat Type observations. This change of habitat use to the forest was probably due to the on-going hunting season and also a change to wintering areas. (Figure 14)

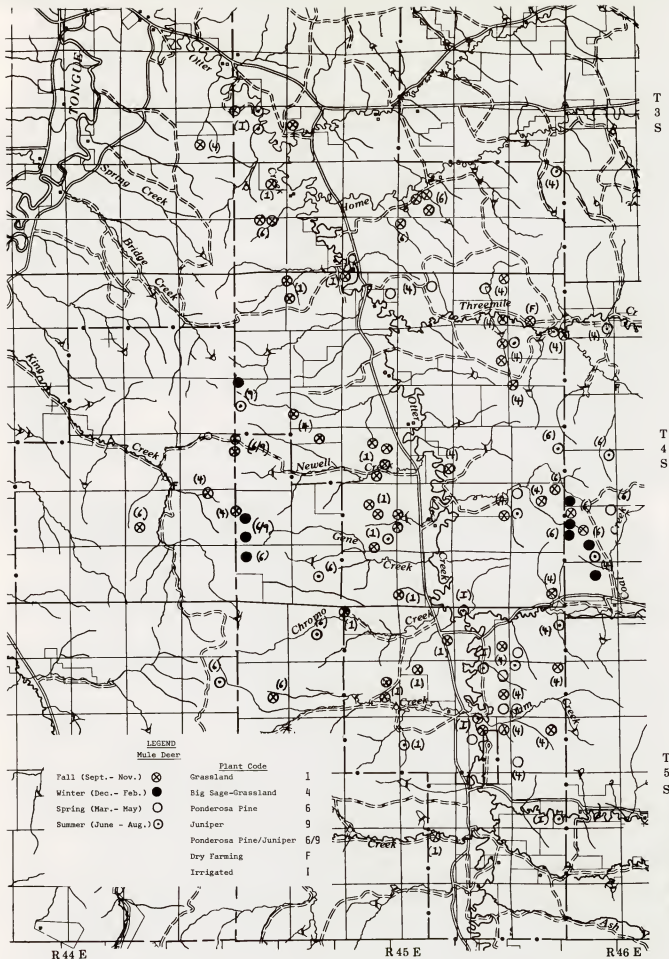


Figure 13. Mule deer distribution on the Ashland Coal Lease Area. Fall 1974 through summer 1975. Numbers in parenthesis are coded habitat types.

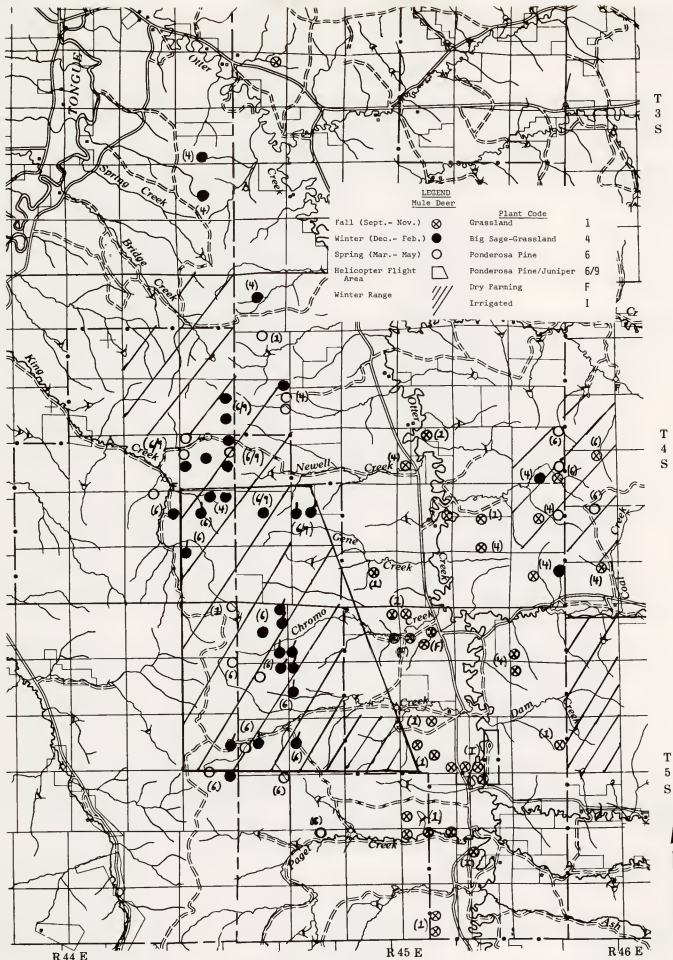


Figure 14. Mule deer distribution on the Ashland Coal Lease Area. Fall 1975 through spring 1976. Numbers in parenthesis are coded habitat types.

The use of the big sage-grassland subtype was about the same for both years. This subtype use is seen under a different habitat type for the two seasons, but this is due more to a subjective decision than any change of deer use of this subtype since the Grassland and Big Sage-Grassland Habitat Types are very intermixed on Otter Creek. The silver sage subtype appeared to be used substantially more during the fall of 1975.

Table 8. Fall use of habitat types by mule deer in the Ashland Coal Lease Area from 479 observations.

	Fall 1974 (312) ¹ H.P.I.	Fall 1975 (167) H.P.I
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	17 ³ (1.06)	4 (.25)
Grassland Park Subtype	7	-
Deciduous Shrub Subtype	8 (+)	2
Ponderosa Pine-Juniper Subtype	3	-
Ponderosa Pine-Juniper-Big Sage		
Mix Subtype	-	3
Alfalfa Field Subtype	5	-
Grassland Habitat Type		
Grassland Subtype	37 ⁴ (2.05)	53 (2.94)
Rhus-Grassland Subtype	Tr	-
Pasture Subtype	3	-
Big Sage-Grassland Subtype	-	19 (.44)
Alfalfa Field Subtype	-	1
Silver Sage Subtype	-	17 (+)
Deciduous Shrub Subtype	-	1
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	14 (.33)	-
Deciduous Shrub Subtype	3 (+)	-
Silver Sage Subtype	3	-
Alfalfa Field Subtype	1	-

¹ Number of deer observed

² Habitat Preference Index (a+ indicates substantial use but no index was calculated).

³ Percentage of the deer observed

⁴ Tr - trace, less than 1 percent

Winter: Habitat use for this season was about the same for the two years. Eighty-four percent of the observations in both winters were in the ponderosa pine and ponderosa pine-juniper subtypes. Virtually all the observations were in the Ponderosa Pine Habitat Type (Table 9).

Table 9. Winter use of habitat types by mule deer in the Ashland Coal Lease Area from 232 observations.

	Winter 1975 (78) ¹	Winter 1976 (154)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	79 ³ (3.2)	60 (3.2)
Ponderosa Pine-Juniper Subtype	5 (3.2)	24 (3.2)
Silver Sage Subtype	15 (+)	-
Grassland Park Subtype	-	14 (4.6)
Juniper Subtype	-	1
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	-	1

¹ Number of deer observed

² Habitat Preference Index (a + indicates substantial use but no index was calculated)

³ Percentage of observations

Spring: During the spring of 1975 about 29 percent of the observations were in the Ponderosa Pine Habitat Type, 28 percent in the Grassland Habitat Type, and 43 percent in the Big Sage-Grassland Habitat Type. During the second spring 87 percent of the observations were in the Ponderosa Pine Habitat Type. Most of this difference is due to the timing of the flights. In 1975 the area was flown in early April. At this time of year the deer are dispersing after winter. In 1976 the same area wasn't flown until the latter part of May. Does have broken off into groups of 2 or 3 or singles getting ready to fawn. Deer are also searching for shelter from sun and flies; therefore, they are spending more time in the Ponderosa Pine Habitat Type.

It is interesting to note the use of the silver sage subtype in 1975 and the lack of use of it in 1976 (Table 10). During the winter of 1975, 15 percent of the observations were in the silver sage subtype. In the spring of 1975, 20 percent of the observations were in this subtype. During 1976, mule deer did not use this subtype during these seasons. It was used in the fall of 1975, but not in 1974. This varying use of a winter food source may well be dictated by the availability of other food or a variation in the palatability of silver sage from year to year.

Table 10. Spring use of habitat types by mule deer in the Ashland Coal Lease Area from 121 observations.

Habitat Type	Spring 1975 (86) ²	Spring 1976 (35)
	H.P.I.	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	-	49 (3.06)
Grassland Park Subtype	-	3 (1.00)
Big Sage-Grassland Subtype	15 ³ (15.0)	9 (9.0)
Ponderosa Pine-Juniper Subtype	-	26 (2.60)
Silver Sage Subtype	14 (+)	-
Grassland Habitat Type		
Grassland Subtype	28 (1.55)	-
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	37 (.86)	11 (.25)
Silver Sage Subtype	6 (+)	-
Grain Field Subtype	-	3

¹ Number of deer observed

² Habitat Preference Index (a + indicates substantial use but no index was calculated)

³ Percent of observation

Summer: Seventy-nine percent of the deer observations were in the Ponderosa Pine Type, 38 percent in the ponderosa pine subtype and 22 percent in the deciduous shrub subtype (table 11). The increase in use of the pine type is probably related to the need for shade during the hot months. The deciduous shrub subtype appears to be especially important at this time of year. It appears to be used for fawning and/or hiding young fawns. This is not to say that the deciduous shrub subtype is the only habitat component used for fawning but it does appear to be favored. The brush is also ideal for shade and avoiding flies.

Table 11. Summer use of habitat types by mule deer in the Ashland Coal Lease Area.

Habitat Types	Summer 1975
	(32) ² H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	383 (2.38)
Deciduous Shrub Subtype	22 (+)
Big Sage-Grassland Subtype	3
Ponderosa Pine-Juniper Subtype	3
Alfalfa Field Subtype	13 (1.86)
Grassland Habitat Type	
Grassland Subtype	9
Ponderosa Pine Subtype	3
Deciduous Shrub Subtype	3 (+)
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	6

- 1 Number of deer observed
- 2 Habitat Preference Index (a + indicates substantial use but no index was calculated)
- 3 Percent of observations

Habitat Preference Indices

Fall: In 1974, 17 percent of the deer observed were using ponderosa pine. This subtype comprises 16 percent of the lease area. The resulting habitat preference index is slightly over 1. In 1975 this subtype only held 4 percent of the deer observations, which resulted in an index of .25. Earlier in the text a possible explanation for the difference in habitat use between years was offered.

The grassland subtype had a rating of over 2. I feel that this subtype was underestimated on the acreage calculations, but as explained earlier, use is overestimated since deer are more observable on this subtype than in timber types.

Silver sage comprised 17 percent of the deer use in 1975 but was so small a type as not to show up on the aerial photos. This would indicate a high preference by deer for the silver sage at least at certain times. A plus (+) is indicated on the table to denote the obvious preference.

The deciduous shrub subtype is also a preferred habitat subtype. No acreage could be obtained, but use was 11 percent and 3 percent for the two years.

Winter: It appears that the ponderosa pine and ponderosa pine-juniper subtypes are winter habitat in this area. In both years the preference rating was 3.2, a show of definite preference for this habitat during this season. This would have to be considered critical winter range for deer in this area. This decision is based on the deer distribution, movements, and topography of the area.

Silver sage was a preferred subtype in 1975, but was not used extensively in 1976.

The grassland park subtype showed a definite preferred use in 1976. Due to the method of determining acreage it is felt that the total acreage of grassland parks was underestimated, which would raise the preference rating. Nevertheless, this subtype was preferred during this year and season. These parks offer food while still being close to escape cover.

Spring: In 1975, with 52 percent of the observations in the big sage-grassland subtype, the preference rating was 15.86. The following year the rating dropped to 9.25. The high ratings may be due to the underestimations of big sage-grassland parks acreage.

In 1975 silver sage comprised 20 percent of total spring use. This subtype continues to display its importance.

In 1976 the timber subtypes, ponderosa pine and ponderosa pine-juniper, comprised 75 percent with a combined index of 5.66. This is a very high rating, but the sample size (of deer) was small.

Summer: The preference rating for the ponderosa pine subtype was 2.38. As stated earlier this subtype may be used for shade cover. The deciduous shrub subtype was also used heavily. Since there is no acreage figure for the deciduous shrub type, a rating cannot be calculated.

Production

In the fall of 1974 a fawn:doe ratio of 55 fawns per 100 does was calculated. This appears to be about average for much of this region. Mackie (1972) felt that 50 to 55 fawns per 100 does would maintain a stable population in the Missouri River Breaks. In the fall of 1975 the ratio was only 36 fawns per 100 does. However, this was based on a small sample (56 females and 20 fawns).

The adult male:female ratio was almost the same for both years, 25 males per 100 does in 1974 and 21 males per 100 females in 1975.

Pronghorn Antelope

Use of Habitat Types

Fall: There appears to be a strong difference in habitat use during the two falls, but the habitat data give a somewhat biased picture (table 12). If one looks at the fall distribution maps (figures 15 and 16) antelope distribution is virtually the same for the two years. The difference in habitat use stems mainly from subjective judgment on the part of the observer when classifying the antelope to habitat type. The grassland and big sage grassland types and subtypes are patchy and intermingled. But it is obvious that the antelope inhabit the grassland and big sage-grassland habitat with some use of pasture fields. However, in 1974 antelope were seen in the big sage-grassland openings within the Ponderosa Pine Type.

Table 12. Fall use of habitat types by antelope in the Ashland Coal Lease Area from 245 observations.

Habitat Types	Fall 1974 (172) ¹	Fall 1975 (73)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Big Sage-Grassland Subtype	16 ³ (16.0)	-
Grassland Habitat Type		
Grassland Subtype	28 (.65)	67 (3.72)
Big Sage-Grassland Subtype	-	22 (.51)
Pasture Subtype	5	11 (+)
Grain Field Subtype	1	-
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	49 (1.14)	-
Grassland Subtype	1	-

¹ Number of antelope observed

² Habitat Preference Index (a + indicates substantial use but no index calculated)

³ Percent of observations

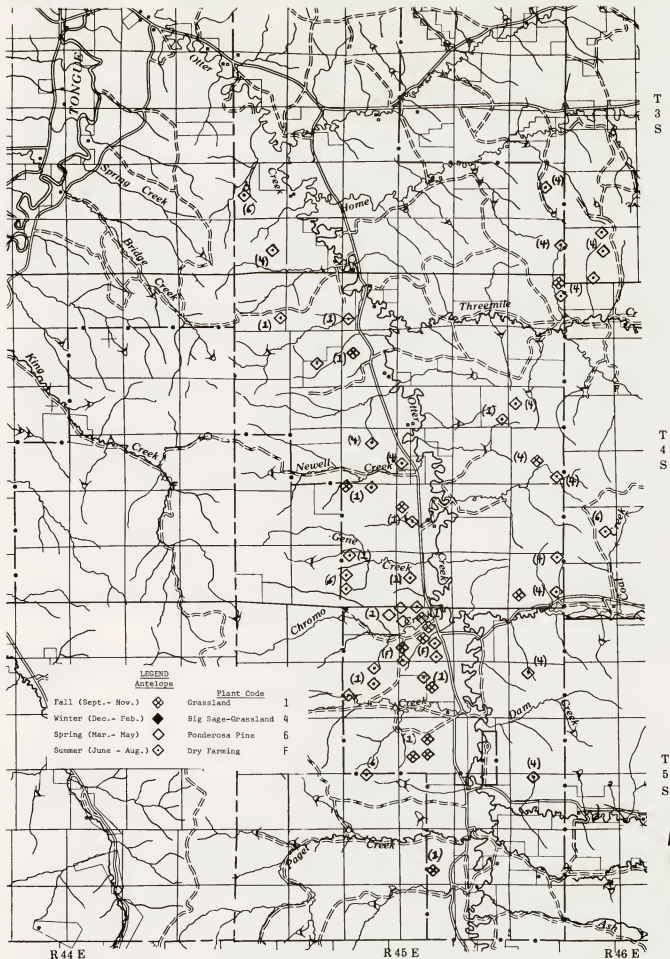


Figure 15. Pronghorn antelope distribution on the Ashland Coal Lease Area - Fall 1974 through summer 1975. Numbers in parenthesis are coded habitat types.

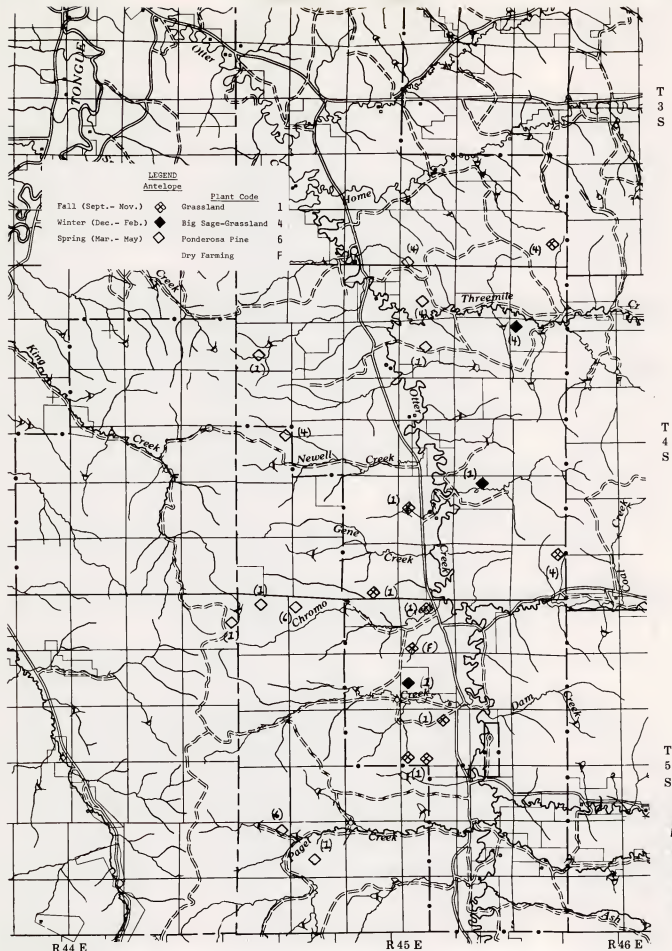


Figure 16. Pronghorn antelope distribution on the Ashland Coal Lease Area - fall 1975 through spring 1976. Numbers in parenthesis are coded habitat types.

Winter: During 1975 all thirty observations were in one herd in the big sage-grassland subtype of the Ponderosa Pine Type. In 1976 two flights were made. Each time a herd of antelope was seen. The first time 25 antelope were seen in the big sage-grassland subtype of the Big Sage-Grassland Type. The second time 28 antelope were seen in the grassland subtype of the Grassland Habitat Type (table 13). It appears that the same herd was being observed. The distribution map shows the location of sightings to be very close between flights and between years. (Figures 15 and 16)

Table 13. Winter use of habitat types by antelope in the Ashland Coal Lease Area from 83 observations.

Habitat Types	Winter 1975 (30) ¹	Winter 1976 (53)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Big Sage-Grassland Subtype	100 ³ (100.)	-
Grassland Habitat Type		
Grassland Subtype	-	53 (2.94)
Big Sage-Grassland Type		
Big Sage-Grassland Subtype	-	47 (1.09)

¹ Number of antelope observed

² Habitat Preference Index

³ Percent of observations

Spring: It appears that the majority of antelope do not return to the Ashland lease area until summer. Of the few antelope observed the majority were utilizing the grassland subtype of the Grassland Habitat Type (table 14).

Summer: Open habitat types were utilized most frequently comprising 88 percent of the observations. The grassland subtype of the Grassland Habitat Type held 54 percent of all the observations. The big sage-grassland subtypes was utilized throughout all the major types. Altogether the big sage-grassland subtype accounted for 36 percent of the observations (Table 15).

Table 14. Spring use of habitat types by antelope in the Ashland Coal Lease Area from 43 observations.

Habitat Types	Spring 1975 (28) ¹	Spring 1976 (15)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Grassland Park Subtype	-	7
Ponderosa Pine-Juniper Subtype	-	7
Grassland Habitat Type		
Grassland Subtype	100 ³ (5.55)	60 (3.33)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	-	27 (.63)

¹ Number of antelope observed

² Habitat Preference Index

³ Percent of observations

Table 15. Summer use of habitat types by antelope in the Ashland Coal Lease Area from 133 observations.

Habitat Types	Summer 1975 (133) ¹
	H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	43
Grassland Park Subtype	6 (2.00)
Big Sage-Grassland Subtype	2
Grassland Habitat Type	
Grassland Subtype	54 (3.00)
Big Sage-Grassland Subtype	11 (.26)
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	23 (.53)

¹ Number of antelope observed

² Habitat Preference Index

³ Percentage of observations

Habitat Preference Rating

Fall: In 1974 the major subtypes were used relative to their availability. No strong preferences were noted but the antelope were using those subtypes, grassland and big sage-grassland, that are needed to sustain their daily needs, a preference rating I call "substantial."

In 1975 most of the sightings were on the grassland subtype. This produced an index of 3.72. However the sample size of antelope was small.

Winter: Since the number of antelope observed was small the preference ratings are not too meaningful.

Spring: It appears that the grassland is preferred range for antelope during spring after wintering on big sage-grassland. The preference ratings for the two years were 5.5 and 3.3, respectively.

Summer: The grassland received the highest preference rating for this season. Grassland seems to be preferred spring and summer antelope range in the Ashland coal lease area (Table 15).

Upper Otter Coal Lease Area

Mule Deer

Use of Habitat Types

Fall: There appeared to be a significant difference in habitat use between the autumns of 1974 and 1975 (table 16). This is possible, but some of the difference was due to the difference in survey between the two years. The use of the big sage-grassland subtype of the Big Sage-Grassland Habitat Type was about the same for the two years, 38 and 44 percent, respectively. The difference appeared in the use of the other two major habitat types. During 1974, 46 percent of the observations were in the Ponderosa Pine Habitat Type and only 12 percent in the Grassland Habitat Type. But in 1975, 39 percent of the observations were in the Grassland Habitat Type and 12 percent in the Ponderosa Pine Habitat Type. In the second year only the east half of the lease area, mainly sagebrush and grassland, was flown. The west half, with more of the ponderosa pine type, was not flown. (Figures 17 and 18)

It is interesting to note that in 1975 twenty-two percent of all the observations were in the deciduous shrub subtype. This is quite high considering the relatively small acreage of this subtype.

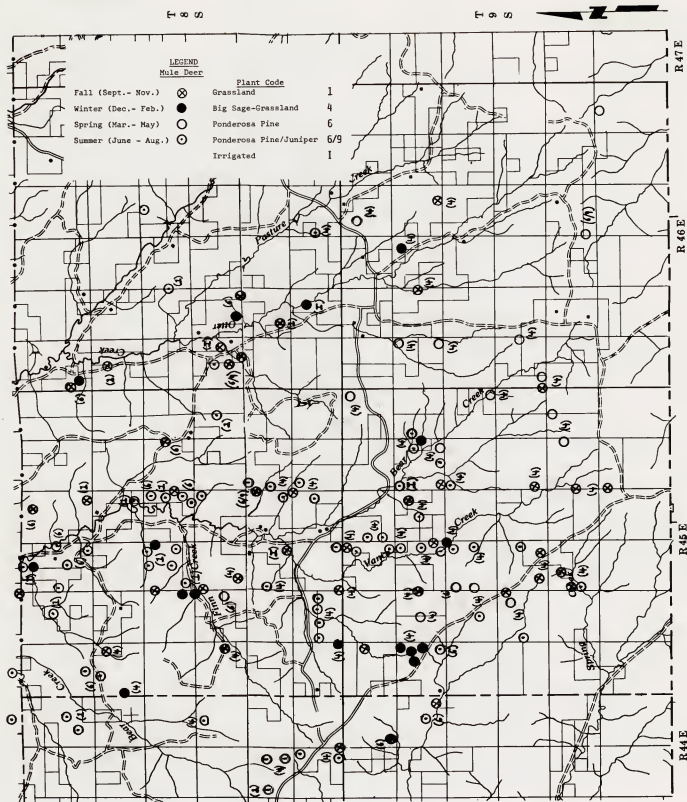


Figure 17. Mule deer distribution on the Upper Otter Creek Coal Lease Area - fall 1974 through summer 1975. Numbers in parenthesis are coded habitat types.

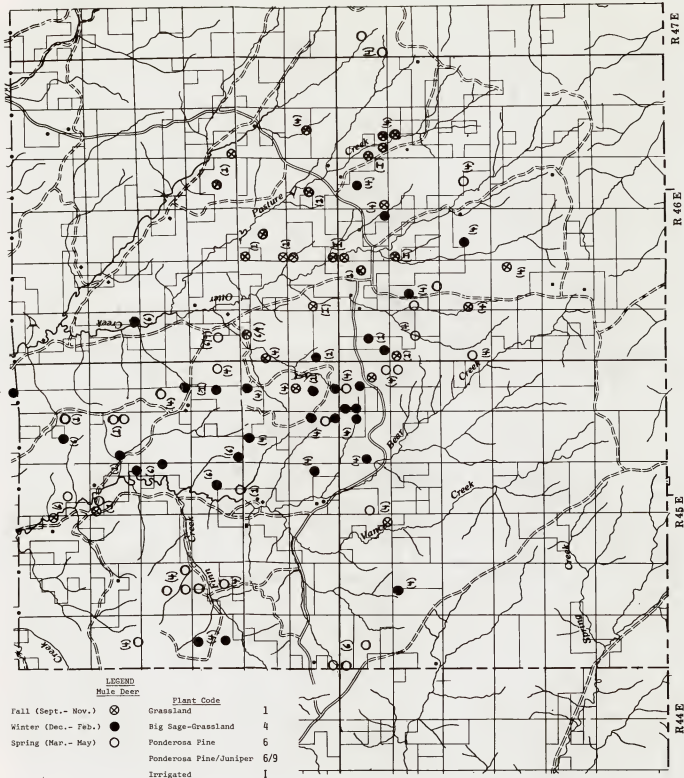


Figure 18. Mule deer distribution on the Upper Otter Creek Coal Lease Area - fall 1975 through spring 1976. Numbers in parenthesis are coded habitat types.

Winter: There was a distinct difference between habitat use in 1975 and 1976. During the first winter 46 percent of the deer observed were using the big sage-grassland subtype, most of this within the Big Sage-Grassland Habitat Type. Another 39 percent of the observations were within the ponderosa pine subtype mostly within the Big Sage-Grassland Habitat Type (table 17). But in 1976, sixty-eight percent of the observations were in the big sage-grassland subtype. Most of the observations within the Ponderosa Pine Habitat Type were in the grassland park subtype. Only 11 percent of the observations were in a timbered type. The difference in use between the two years is probably the result of weather conditions. The winter of 1975, at least during the survey, was colder than 1976 and the deer were seeking the shelter of the timber.

Table 16. Fall use of habitat types by mule deer in the Upper Otter Creek Coal Lease Area from 406 observations.

Habitat Types	Fall 1974 (283) ¹	Fall 1975 (123)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	163 (1.23)	1
Grassland Park Subtype	7 (.32)	-
Deciduous Shrub Subtype	2	11 (+)
Big Sage-Grassland Subtype	11 (.20)	-
Alfalfa Field Subtype	10 (3.33)	-
Grassland Habitat Type		
Grassland Subtype	6 (.27)	14 (.64)
Pasture Subtype	6	-
Alfalfa Field Subtype	-	7 (2.33)
Grain Field Subtype	-	7
Deciduous Shrub Subtype	-	11 (+)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	38 (.68)	44 (.79)
Deciduous Shrub Subtype	1	-
Silver Sage Subtype	2	-
Ponderosa Pine Subtype	1	5 (.38)
Grassland Subtype	-	1

¹ Number of deer observed

² Habitat Preference Index (a + indicates substantial use but no index was calculated)

³ Percent of the observations

Table 17. Winter use of habitat types by mule deer in the Upper Otter Creek Coal Lease Area from 426 observations.

Habitat Types	Winter 1975 (152) ¹	Winter 1976 (274)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	17 ³ (1.31)	2
Grassland Park Subtype	7 (.31)	15 (.68)
Big Sage-Grassland Subtype	7 (.12)	-
Silver Sage Subtype	8 (+)	-
Grassland Habitat Type		
Grassland Subtype	-	6 (.27)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	39 (.70)	68 (1.21)
Ponderosa Pine Subtype	22 (1.69)	-
Juniper Subtype	-	3
Ponderosa Pine-Juniper Subtype	-	6 (2.00)

1 Number of deer observed

2 Habitat Preference Index (a + indicates substantial use but no index was calculated)

3 Percentage of observations

Spring: It is evident from table 18 that deer were utilizing many more habitat types in the spring of 1976 than the preceding year. Several causes could be responsible. The spring of 1976 may have been conducive to an earlier breaking up of winter groups spreading out into summer range types. Also part of the survey was flown about 11 days later than the year before, but most of the area was flown at almost exactly the same time as in 1975. Deer were seen in the west portion of the lease area where none had been seen in the spring of 1975.

Summer: During this season most of the deer were seen in the west portion of the lease area. Thirty-two percent of the deer observed were using the big sage-grassland subtype of the Big Sage-Grassland Habitat Type. Almost half the deer (45 percent) were within the Ponderosa Pine Habitat Type, the ponderosa pine subtype and grassland subtype being utilized most. Fifteen percent of the deer observed were in the deciduous shrub subtype. Most of this was within the Big Sage-Grassland Habitat Type. (Table 19) This subtype is the most prominent cover in this open habitat type. It appears to be used most by deer during this season, probably for fawning and shade.

Table 18. Spring use of habitat types by mule deer in the Upper Otter Creek Coal Lease Area from 243 observations.

Habitat Types	Spring 1975 (122) ¹	Spring 1976 (121)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	-	12 (.92)
Grassland Park Subtype	-	1
Rhus-Grassland Subtype	-	2
Deciduous Shrub Subtype	-	8 (+)
Big Sage-Grassland Subtype	23 (.04)	21 (.38)
Ponderosa Pine-Juniper Subtype	-	2 (.66)
Grassland Habitat Type		
Grassland Subtype	-	4 (.18)
Big Sage-Grassland Subtype	-	3 (.05)
Alfalfa Field Subtype	-	10 (3.33)
Ponderosa Pine Subtype	-	4 (.31)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	98 (1.75)	28 (.50)
Deciduous Shrub Subtype	-	1
Ponderosa Pine Subtype	-	3 (.23)

1 Number of deer observed

2 Habitat Preference Index (a + equals substantial use but no index was calculated)

3 Percentage of observations

Habitat Preference Rating

Fall: Alfalfa fields showed top preference during both falls, 3.33 in 1974 and 2.33 in 1975. In 1974 the ponderosa pine and big sage-grassland subtypes had nearly normal utilization, with a slight preference shown for the pine. The grassland subtype showed a preference of less than 1.0.

In 1975 the deciduous shrub subtype was given an extraordinary preference by mule deer. Therefore the grassland and big sage-grassland subtypes did not show even normal preference. (Table 16)

Winter: For 1975, deer showed a strong preference for the ponderosa pine subtype with a total rating of 3.00. The big sage-grassland subtype showed a low preference. Again, the silver sage subtype played a significant role for such a relatively minor vegetation type.

Table 19. Summer use of habitat types by mule deer in the Upper Otter Creek Coal Lease Area from 120 observations.

Habitat Types	Summer (120) ¹	H.P.I. ²
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	20 ³	(1.54)
Grassland Subtype	18	(.81)
Deciduous Subtype	2	
Big Sage-Grassland Subtype	4	(.07)
Silver Sage Subtype	1	
Grassland Habitat Type		
Grassland Subtype	1	(.05)
Rhus-Grassland Subtype	1	
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	32	(.57)
Grassland Subtype	1	(.05)
Deciduous Shrub Subtype	13	(+)
Silver Sage Subtype	6	(+)
Ponderosa Pine Subtype	1	

1 Number of deer observed

2 Habitat Preference Index (a + indicates substantial use but no index was calculated)

3 Percentage of observations

In 1976 deer showed a slight preference for the major plant community in the area, the big sage-grassland subtype.

The ponderosa pine-juniper subtype seemed to have been preferred with a preference rating of 2.00, but the more widespread ponderosa pine subtype accounted for very few deer observations (Table 17).

Spring: All the observations for 1975 were in the big sage-grassland subtype. This yielded a preference rating of 1.79.

In 1976 mule deer selected alfalfa fields with a 3.33 preference index. This was followed by a preference for the ponderosa pine subtype with a 1.46 index. Big sage-grassland had a "normal" preference (close to 1). The deciduous shrub subtype again played a significant role (Table 18).

Summer: The greatest preference was for the ponderosa pine subtype with a rating of 1.54.

The deciduous shrub and silver sage subtypes were obviously highly preferred. Since the acreage was too small to measure, no index figure could be calculated, but 22 percent of the observations were in these limited subtypes (Table 19).

Production

The fawn:doe ratio was the same for the falls of 1975 and 1976, 62 fawns per 100 does. But the adult male:female ratio changed considerably. In 1975 there were about 12 males per 100 females and in 1976, 33 males per 100 females. This large increase was no doubt due to sampling error.

Antelope

Use of Habitat Types

Fall: In 1974 the biggest concentration of antelope (38 percent) was on alfalfa fields within the Big Sage-Grassland Habitat Type. This was closely followed by 33 percent use of the big sage-grassland subtype. Within the Ponderosa Pine Habitat Type the big sage-grassland subtype accounted for 22 percent of the observations. Combining the subtypes yields a total of 55 percent of the antelope use on sagebrush terrain (table 20). In 1975 sixty-one percent of the antelope habitat use was on sagebrush terrain, all within the Big Sage-Grassland Habitat Type. The remainder of the observations were in the grassland subtype of the Grassland Habitat Type. A possible reason why no use of alfalfa fields was noted was the exceptionally good growing year. There may have been more forage left on the uplands. There also may have been use of the Ponderosa Pine Habitat Type, but the west section of the lease area was not flown. See figures 19 and 20 for seasonal distribution.

Winter: It is obvious from table 21 that big sage-grassland is the habitat preferred by antelope in winter.

Spring: Habitat use is fairly consistent between the two springs. What use was made of the Ponderosa Pine Habitat Type was in the big sage-grassland parks. Most of the rest of the observations were in the Big Sage-Grassland Habitat Type (table 22). There was grassland use in 1976 that did not show up in 1975. But this does not indicate a change in distribution or range use since these types were intermixed.

Table 20. Fall use of habitat types by antelope in the Upper Otter Creek Coal Lease Area from 340 observations.

Habitat Types	Fall 1974 (216) ¹	Fall 1975 (124)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	5 ³	-
Big Sage-Grassland Subtype	22 (.39)	-
Grassland Habitat Type		
Grassland Subtype	2	39 (1.77)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	33 (.58)	61 (1.09)
Alfalfa Field Subtype	38 (12.67)	-

- ¹ Number of antelope observed
² Habitat Preference Index
³ Percentage of observation

Table 21. Winter use of habitat types by antelope in the Upper Otter Creek Coal Lease Area from 705 observations.

Habitat Types	Winter 1975 (147) ¹	Winter 1976 (558)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	8 ³	-
Big Sage-Grassland Subtype	92 (1.64)	100 (1.78)

- ¹ Number of antelope observed
² Habitat Preference Index
³ Percent of the observations

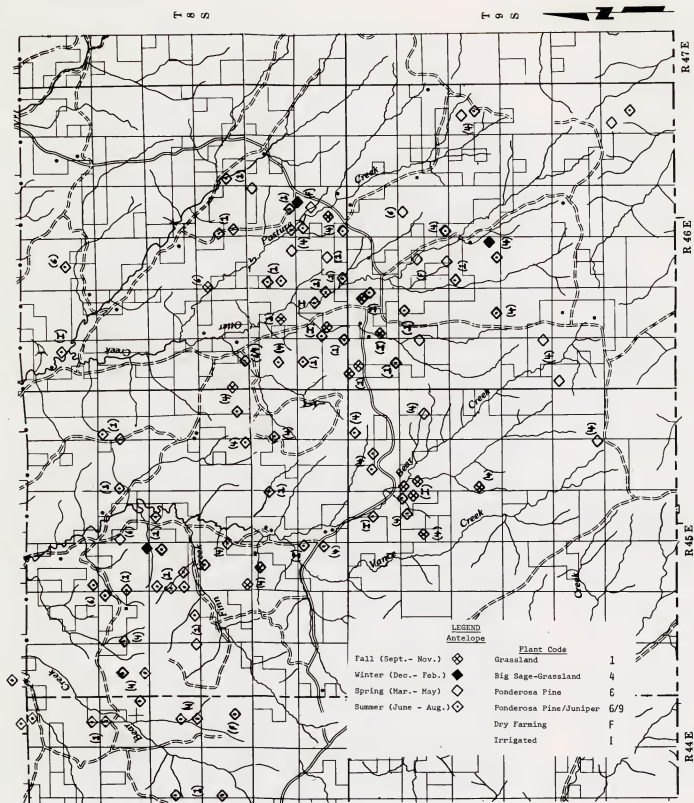


Figure 19. Pronghorn antelope distribution on the Upper Otter Creek Coal Lease Area - fall 1974 through summer 1975. Numbers in parenthesis are coded habitat types.

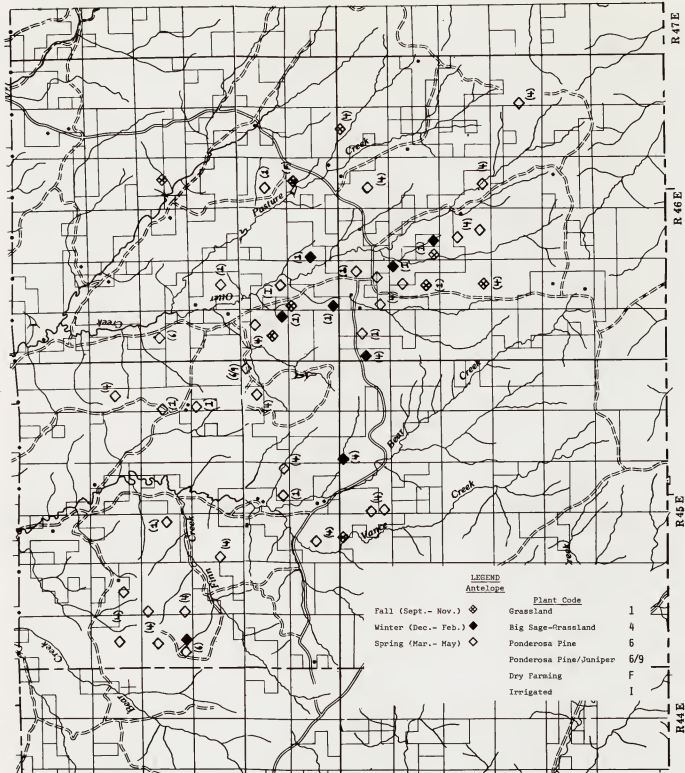


Figure 20. Pronghorn antelope distribution on the Upper Otter Creek Coal Lease Area. Fall 1975-spring 1976. Numbers in parenthesis are coded habitat types.

Table 22. Spring use of habitat types by antelope in the Upper Otter Creek Coal Lease Area from 188 observations.

Habitat Types	Spring 1975 (83) ¹	Spring 1976 (105)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Big Sage-Grassland Subtype	10 ³ (.18)	13 (.23)
Grassland Habitat Type		
Grassland Subtype	-	28 (1.27)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	81 (1.45)	57 (1.02)
Alfalfa Field Subtype	10 (3.33)	2 (.67)

- 1 Number of antelope observed
 2 Habitat Preference index
 3 Percent of the observations

Summer: The majority of the antelope were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type with a few sightings in other types. (Table 23)

Table 23. Summer use of habitat types by antelope in the Upper Otter Creek Coal Lease Area from 323 observations.

Habitat Types	Summer 1975 (323) ¹
	H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	2 ³
Grassland Park Subtype	7 (.32)
Big Sage-Grassland Subtype	5 (.09)
Grassland Habitat Type	
Grassland Subtype	2
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	82 (1.46)
Grassland Subtype	1
Grain Subtype	1

- 1 Number of antelope observed
 2 Habitat Preference Index
 3 Percent of the observations



Habitat Preference Index

Fall: The only preference shown in 1974 was on alfalfa fields. The 38 percent use yielded an index of 12.67. Big sage-grassland was used at a rate equal to its availability.

In 1975 the big sage-grassland continued to be used at a normal rate. However preference was shown for the grassland subtype with a rating of 1.77 (Table 20).

Winter: Winter use was almost confined to one subtype for the two years with a preference index of 1.64 and 1.78 for the big sage-grassland. Preference ratings are not high for the subtype which encompasses 56 percent of the area, but since this is virtually the only subtype the antelope used it is obviously critical to their winter survival (Table 21).

Spring: During 1975 alfalfa fields showed a preference rating of 3.33. The big sage-grassland subtype showed the same preference in the spring of 1975 as it did in the winter of 1975, which was 1.63. In 1976 the preference for this type was 1.25 (Table 22).

Summer: The big sage-grassland subtype showed the only preference with a rating of 1.55 (Table 23).

Hanging Woman Coal Lease Area

Mule Deer

Use of Habitat Types

Fall: Thirty-four percent of the observations were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type in 1974. This was followed by 18 percent of the observations in the big sage-grassland openings of the ponderosa pine type. Together they represent 52 percent of all the observations. Eighteen percent of the observations were also located in the deciduous shrub subtype (usually creek bottoms) of the Big Sage-Grassland Habitat Type (table 24). This may be due to the fact that the creek bottoms offer a certain measure of cover and some preferred food items in an area otherwise composed of sagebrush prairie.

Winter: Habitat use between the two winters are very similar. In 1975, 66 percent of the observations were in the big sage-grassland subtype, (51 percent in the Big Sage-Grassland Habitat Type and 15 percent in the Ponderosa Pine Habitat Type). In 1976, 60 percent of the observations were in the big sage-grassland subtype with a similar division between major Habitat Types (table 25). In the Big Sage-

Grassland Habitat Type 18 percent of the observations were in timber types during 1975 and 20 percent during 1976. In the Ponderosa Pine Habitat Type 16 percent of the observations were in timber in 1975 and 8 percent in 1976. During 1976, grassland parks were used 11 percent of the time (Figures 21 and 22).

Table 24. Fall use of habitat types by mule deer in the Hanging Woman Creek Coal Lease Area from 145 observations.

Habitat Types	Fall 1974 (145) ¹ H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	63 (.66)
Big Sage-Grassland Subtype	18 (18.0)
Ponderosa Pine-Juniper Subtype	1
Grassland Habitat Type	
Grassland Subtype	1
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	34 (.59)
Grassland Subtype	14 (.82)
Deciduous Shrub Subtype	18 (+)
Silver Sage Subtype	1
Alfalfa Field Subtype	2
Greasewood Subtype	3
Ponderosa Pine Subtype	1

¹ Number of deer observed

² Habitat Preference Index (a + indicates substantial use but no index calculated)

³ Percent of observations

Spring: The major subtype utilized was the same for the 2 years, the big sage-grassland subtype of the Ponderosa Pine and Big Sage-Grassland Habitat Types (table 26). During the second year there was more use of the Grassland Habitat Type, Ponderosa Pine Habitat Type and its big sage-grassland subtype.

Summer: The combined timber types yielded 23 percent of the deer sighted. The big sage-grassland subtypes dropped to 38 percent (table 27). This is the same trend as seen in the Upper Otter Creek area, with the use of timber habitat

Table 25. Winter use of habitat types of mule deer in the Hanging Woman Creek Lease Area from 444 observations.

Habitat Types	Winter 1975 (177) ¹	Winter 1976 (267)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	12 ³ (1.33)	8 (.89)
Grassland Park Subtype	-	11 (36.7)
Big Sage-Grassland Subtype	15 (15.0)	13 (13.0)
Ponderosa Pine-Juniper Subtype	4	-
Deciduous Shrub Subtype	-	1
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	51 (.88)	47 (.81)
Ponderosa Pine Subtype	18 (2.00)	7 (.78)
Ponderosa Pine-Juniper Subtype	-	13 (1.18)

- 1 Number of deer observed
- 2 Habitat Preference Index
- 3 Percent of the observations

Table 26. Spring use of habitat types by mule deer in the Hanging Woman Lease Area from 500 observations.

Habitat Types	Spring 1975 (314) ¹	Spring 1976 (186)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	-	11 (1.22)
Grassland Park Subtype	-	2
Big Sage-Grassland Subtype	26 ³ (26.0)	34 (34.0)
Alfalfa Field Subtype	-	6 (3.0)
Ponderosa Pine-Juniper Subtype	12 (1.09)	-
Grassland Habitat Type		
Grassland Subtype	-	8 (.47)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	58 (1.00)	34 (.59)
Alfalfa Field Subtype	2 (1.00)	3 (1.50)
Ponderosa Pine-Juniper Subtype	3	-
Deciduous Shrub Subtype	-	1
Silver Sage Subtype	-	1

- 1 Number of deer observed
- 2 Habitat Preference Index
- 3 Percent of the observations

Table 27. Summer use of habitat types by mule deer in the Hanging Woman Lease Area from 135 observations.

Habitat Types	Summer 1975
	(135) ¹ H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	16 ³ (1.78)
Grassland Park Subtype	11 (22.0)
Big Sage-Grassland Subtype	7 (7.0)
Ponderosa Pine-Juniper Subtype	2
Ponderosa Pine-Juniper Big Sage Mix Subtype	2
Grassland Habitat Type	
Grassland Subtype	1
Greasewood Subtype	4
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	31 (.53)
Grassland Subtype	5
Deciduous Subtype	10 (+)
Silver Sage Subtype	1
Pasture Subtype	5
Greasewood Subtype	1
Ponderosa Pine Subtype	3

¹ Number of deer observed

² Habitat Preference Index (a + indicates substantial use but no index calculated)

³ Percent of the observations

dropping in the spring and the consequent rise in use of the big sage communities. With the coming of summer the deer reduced use of the sagebrush prairie and returned to the timber types.

Production

For the fall of 1974 the fawn:doe ratio was 58 fawns per 100 does. The winter fawn per adult ratio was 61 fawns per 100 adults in 1975 and 71 fawns per 100 adults in 1976. In 1975 the adult male:female ratio was 26 males per 100 females and in 1976, 23 males per 100 females.

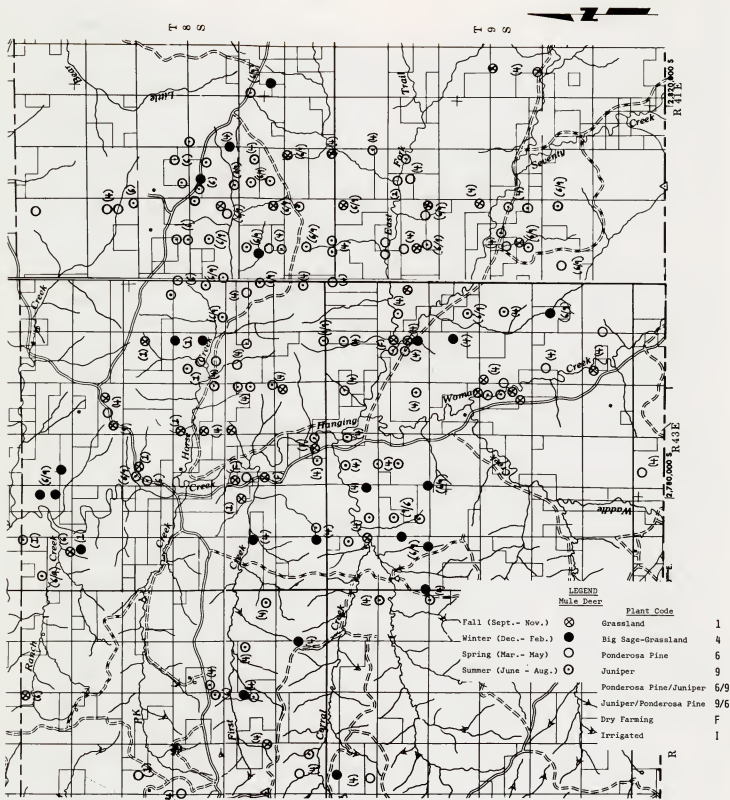


Figure 21. Mule deer distribution on the Hanging Woman Coal Lease Area. Fall 1974-Summer 1975. Numbers in parenthesis are coded habitat types.

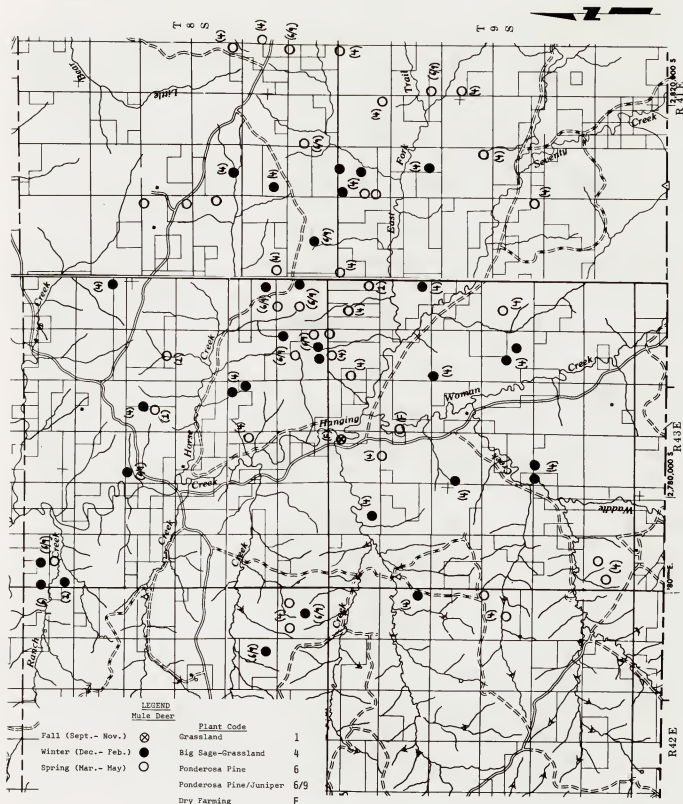


Figure 22. Mule deer distribution on the Hanging Woman Coal Lease Area. Fall 1975-Spring 1976. Numbers in parenthesis are coded habitat types.

Habitat Preference Index

Fall: There appears to be a preference for the big sage-grassland parks of the Ponderosa Pine Type. The association of parks within the Pine Type allows for feeding areas adjacent to cover.

Preference for the deciduous shrub subtype is obvious. Eighteen percent of the deer observations were within this limited type (Table 24).

Winter: Preference ratings were very similar for the two years. During 1975 and 1976 the big sage-grassland parks within the Ponderosa Pine Habitat Type seem to be highly preferred with indexes of 15.0 and 13.0, respectively. This subtype is probably over rated with these indexes since only the larger parks could be included in the acreage calculations.

The timber types within the Big Sage-Grassland Habitat Type were also preferred with ratings of 2.0 and 1.96 for the two years. (Table 25).

It appears that in areas where deer have an abundance of cover, a scattering of parks is needed for feeding, and in open terrain the islands of timber are needed for cover.

Spring: During this season the major preference was for the big sage-grassland parks of the Ponderosa Pine Habitat Type. For the two years the preference rating was 26.0 and 34.0. During 1975 the big sage grassland of the Big Sage-Grassland Habitat Type was used at a "normal" rate. It was underused in 1976, but there was more use of the grassland subtype and of the Ponderosa Pine Habitat Type in general (Table 26).

There was a strong preference use of alfalfa fields in 1976.

Summer: The grassland parks and the big sage-grassland parks of the Ponderosa Pine Habitat Type received heavy use during this season. The ponderosa pine subtype rating showed some preference. It appears that the more secluded habitat of pine timber plus open parks is preferred during the summer.

Within the Big Sage-Grassland Habitat Type the deciduous shrub subtype appeared to be used quite extensively, comprising 10 percent of the use. This subtype seems to be preferred during spring and summer wherever it is found (Table 27).

Antelope

Use of Habitat Types

Fall: As would be expected, almost all the observations were in the Big Sage-Grassland Type and subtype (table 28).

Winter: For both winters the big sage-grassland subtype of the Big Sage-Grassland Habitat Type contained all the antelope observations (table 29).

Spring: The habitat use for the two years was almost identical, with 34 percent of the observations in the grassland subtype of the Grassland Habitat Type and about 65 percent in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type (table 30). The habitat use between years was much more uniform for antelope than mule deer. This may be due to the more restrictive requirements of antelope.

Summer: During this season antelope were somewhat more diversified in their use of habitat types. Forty-five percent of the antelope observations were in grassland subtypes and 54 percent in big sage-grassland subtypes (table 31) (figures 23 and 24).

Table 28. Fall use of habitat types by antelope in the Hanging Woman Lease Area from 463 observations.

Habitat Types	Fall 1974
	(463) ¹ H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	33
Grassland Subtype	2
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	95 (1.64)
Grassland Subtype	1

1 Number of antelope observed

2 Habitat Preference Index

3 Percent of the observations

Table 29. Winter use of habitat types by antelope in the Hanging Woman Lease Area from 470 observations.

Habitat Types	Winter 1975 (186) ¹	Winter 1976 (284)
	H.P.I. ²	H.P.I.
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	100 ³ (1.72)	100 (1.72)

¹ Number of antelope observed

² Habitat Preference Index

³ Percent of the observations

Table 30. Spring use of habitat types by antelope in the Hanging Woman Lease Area from 208 observations.

Habitat Types	Spring 1975 (83) ¹	Spring 1976 (125)
	H.P.I. ²	H.P.I.
Grassland Habitat Type		
Grassland Subtype	34 ³ (2.00)	34 (2.00)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	66 (1.14)	64 (1.10)
Grassland Subtype	-	2

¹ Number of antelope observed

² Habitat Preference Index

³ Percent of the observations

Habitat Preference Ratings

Fall: Virtually all the observations were in the big sage-grassland subtype with a preference rating of 1.64 (Table 28).

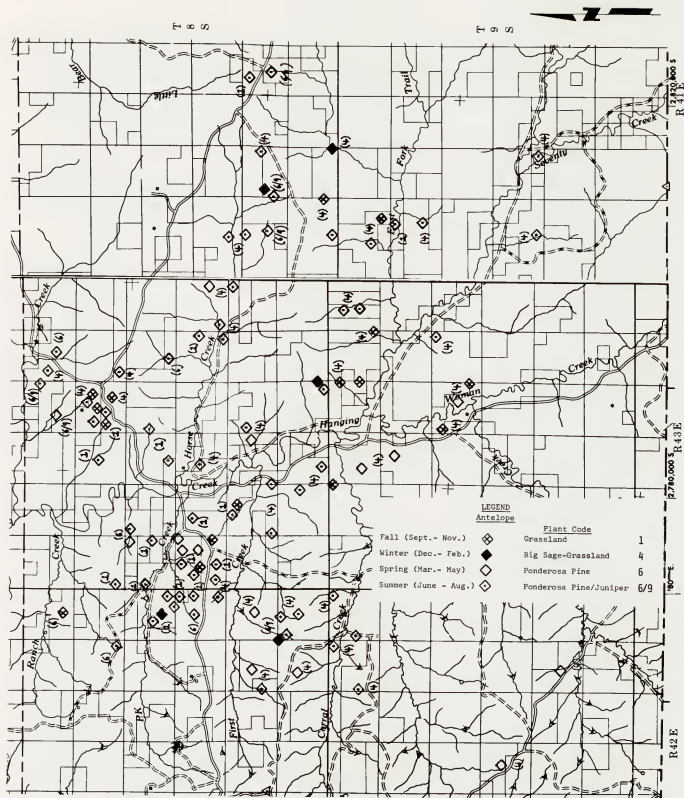


Figure 23. Pronghorn antelope distribution on the Hanging Woman Coal Lease Area. Fall 1974-Summer 1975. Numbers in parenthesis are coded habitat types.

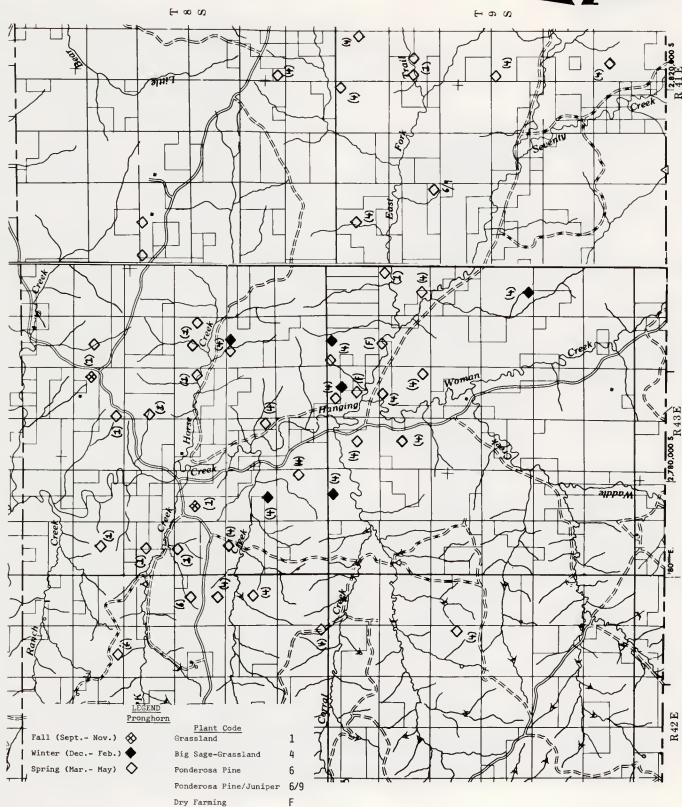


Figure 24. Pronghorn antelope distribution on the Hanging Woman Creek Lease Area. Fall 1975-Spring 1976. Numbers in parenthesis are coded habitat types.

Table 31. Summer use of habitat types by antelope in the Hanging Woman Lease Area from 405 observations.

Habitat Types	Summer 1975	
	(405) ¹	H.P.I. ²
Ponderosa Pine Habitat Type		
Grassland Park Subtype	93	(18.0)
Big Sage-Grassland Subtype	6	(6.0)
Grassland Habitat Type		
Grassland Subtype	36	(2.12)
Big Sage-Grassland Subtype	14	(.24)
Rhus-Grassland Subtype	Tr	
Greasewood Subtype	1	
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	34	(.59)

1 Number of antelope observed

2 Habitat Preference Index

3 Percent of the observations

Winter: All the antelope observed wintered in the big sage-grassland subtype. The preference rating was 1.72. This means that of 470 observations all of them were in the big sage-grassland even though this subtype made up only 58 percent of the area (Table 29).

Spring: Use of the big sage-grassland during this season showed only normal use. However, a definite preference was seen for the grassland subtype with an index of 2.0 (Table 30).

A change of diet to forbs was a major factor in this habitat switch.

Summer: The grassland subtype was used preferentially during this season, at about the same rate as during spring. The use of big sage-grassland declined but preference for grassland and big sage-grassland parks was high (table 31).

Decker Coal Lease Area

Mule Deer

Use of Habitat Types

Fall: As can be seen from table 32, seventy-nine percent of the observations were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type.

Winter: Even though the big sage-grassland subtype of the Big Sage-Grassland Habitat Type was the plant community of major use during both years, use of smaller habitat types varied considerably. During the second winter use of the timbered subtypes increased to 47 percent. The silver sage subtype was important during 1975 (Table 33).

Spring: During the first spring two-thirds of the observations were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type and 19 percent in its juniper subtype. The second spring only one-third of the observations were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type and 9 percent in its juniper subtype, but 34 percent of the observations were in the ponderosa pine subtype (table 34). Within the Ponderosa Pine Habitat Type, the Rhus-grassland subtype contained 19 percent of the observations. It appeared that the deer were closer to the heads of the drainages the second year (Figures 25 and 26).

Table 32. Fall use of habitat types by mule deer in the Decker Coal Lease Area from 139 observations.

Habitat Types	Fall 1974 (139) ¹ H.P.I. ²
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	79 ³ (1.13)
Deciduous Shrub Subtype	10 (+)
Juniper Subtype	5 (.71)
Grain Field Subtype	6

1 Number of deer observed

2 Habitat Preference Index (a + indicates substantial use but no index was calculated)

3 Percent of the observations

Table 33. Winter use of habitat types by mule deer in the Decker Coal Lease Area from 603 observations.

Habitat Types	Winter 1975 (280) ¹	Winter 1976 (323)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Big Sage-Grassland Subtype	2 ³	-
Ponderosa Pine-Juniper Subtype	-	17 (5.67)
Grassland Habitat Type		
Grassland Subtype	3	-
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	62 (.89)	53 (.76)
Juniper Subtype	7 (1.00)	3 (.43)
Ponderosa Pine Subtype	-	27 (6.75)
Silver Sage Subtype	10 (+)	-
Roadside Vegetation Subtype	13 (+)	-
Big Sage-Juniper Mix Subtype	2	-

1 Number of deer observed

2 Habitat Preference Index (a + indicates substantial use but no index was calculated)

3 Percent of the observations

Table 34. Spring use of habitat types by mule deer in the Decker Coal Lease Area from 496 observations.

Habitat Types	Spring 1975 (429) ¹	Spring 1976 (67)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Big Sage-Grassland Subtype	2 ³	3
Rhus-Grassland Subtype	-	19 (+)
Ponderosa Pine-Juniper Subtype	3 (1.00)	-
Grain Field Subtype	3	-
Juniper Subtype	1	-
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	67 (.96)	34 (.49)
Juniper Subtype	19 (2.71)	9 (1.29)
Alfalfa Field Subtype	4 (2.00)	-
Ponderosa Pine Subtype	-	34 (8.50)

1 Number of deer observed

2 Habitat Preference Index (a + indicates substantial use but no index was calculated)

3 Percent of the observations

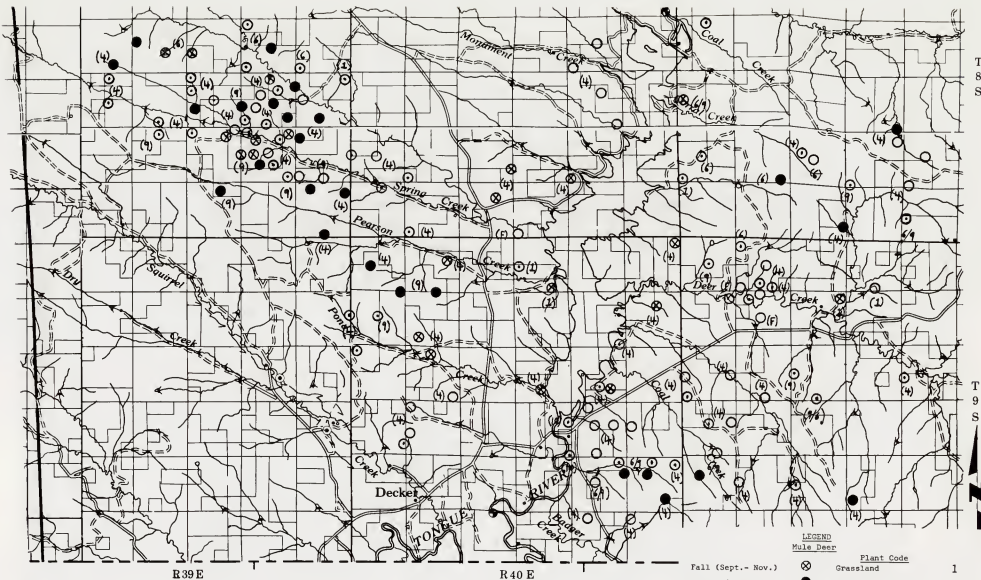


Figure 25. Mule deer distribution on the Decker Coal Lease Area. Fall 1974-Summer 1975. Numbers in parenthesis are coded habitat types.

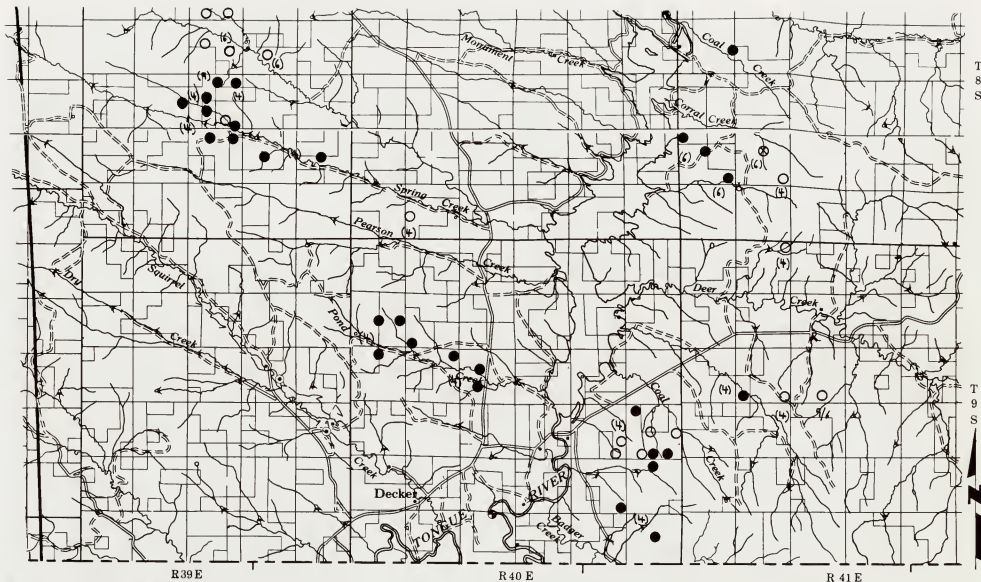


Figure 26. Mule deer distribution on the Decker Coal Lease Area. Fall 1975-Spring 1976. Numbers in parenthesis are coded habitat types.

LEGEND		Plant Code	
Mule Deer			
Fall (Sept.- Nov.)	⊗	Big Sage-Grassland	4
Winter (Dec.- Feb.)	●	Ponderosa Pine	6
Spring (Mar.- May)	○	Juniper	9
		Juniper/Ponderosa Pine	9/6

Summer: The big sage-grassland subtype of the Big Sage-Grassland Habitat Type comprised 43 percent of the observations even though deer were spread throughout many habitats. The timbered subtypes together yielded 38 percent of the deer observations (table 35).

Production

In 1974 the fawn:doe ratio was 52 fawns per 100 does and the adult male:female ratio was 17 males per 100 families.

Habitat Preference Index

Fall: The big sage-grassland subtype was used at nearly the expected rate. However, the deciduous shrub subtype looks as if it was preferred, accounting for 19 percent of the observations (table 32).

Winter: In 1975 the big sage-grassland and the juniper subtypes were utilized at a normal rate. But the silver sage subtype and the roadside vegetation subtype accounted for 23 percent of the observations, appearing to be preferred for this season.

During 1976 the timber subtypes were used much more heavily than in 1975. The ponderosa pine-juniper subtype of the Ponderosa Pine Habitat Type had a preference rating of 5.67. The ponderosa pine subtype of the Big Sage-Grassland Habitat Type had a preference rating of 6.75. Most likely, weather conditions were such that deer found need to utilize the timber types. And the subtypes that were utilized at a normal rate in 1975 (juniper and big sage-grassland) were underutilized (table 33).

Spring: During 1975 the big sage-grassland subtype received most of the use, but preference rating showed this use about normal. However, the juniper subtype and alfalfa fields showed definite preference with ratings of 2.71 and 2.0.

In 1976 use of the big sage-grassland subtype decreased, being utilized at about one-half of its availability.

Use of the juniper subtype decreased but still showed some preference. Use of the ponderosa pine within the Big Sage-Grassland Habitat Type was very significant and had a preference index of 8.50. This was the same trend for the two years during winter (table 34).

The *Rhus*-grassland subtype accounted for 19 percent of the observations. This was due to deer being closer to the heads of drainages and thereby utilizing this habitat subtype.

Table 35. Summer use of habitat types by mule deer in the Decker Coal Lease Area from 75 observations.

Habitat Types	Summer 1975
	(75) ¹ H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	7 ³ (1.75)
Grassland Park Subtype	1 (+)
Ponderosa Pine-Juniper Subtype	4 (1.33)
Juniper Subtype	8 (1.14)
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	43 (.61)
Deciduous Shrub Subtype	3
Agricultural Subtype	5
Silver Sage Subtype	1
Juniper Subtype	3
Alfalfa Field Subtype	7 (3.50)
Ponderosa Pine Subtype	11 (2.75)
Big Sage-Juniper Subtype	1
Ponderosa Pine-Juniper Subtype	5 (1.67)
Rhus-Grass Subtype	3

¹ Number of deer observed

² Habitat Preference Index (a + indicates substantial use but no index was calculated)

³ Percent of the observations

Summer: Even though the bulk of the observations were in the big sage-grassland subtype no preference was shown. It was being used at much less than its availability. The timber types showed varying degrees of preference use. Within the Ponderosa Pine Habitat Type the ponderosa pine subtype had a preference rating of 1.75. The ponderosa pine-juniper and the juniper subtypes showed only slight preference.

Within the Big Sage-Grassland Habitat Type the ponderosa pine-juniper subtype showed some preference use. The ponderosa pine subtype was significantly preferred with an index of 2.75.

The combined timber subtypes had an index of 1.53 (table 35). Alfalfa fields had an index of 3.50.

Antelope

Use of Habitat Types

Fall: Two-thirds of the antelope observations were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type. Another 21 percent was found in grain fields (table 36).

Table 36. Fall use of habitat types by antelope in the Decker Coal Lease Area from 96 observations.

Habitat Types	Fall 1974
	(96) ¹ H.P.I. ²
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	68 ³ (.97)
Alfalfa Field Subtype	3 (1.50)
Grain Field Subtype	21 (7.0)
Pasture Subtype	7
Big Sage-Juniper Subtype	1

¹ Number of antelope observed

² Habitat Preference Index

³ Percent of the observations

Winter: The majority of the observations were in the big sage-grassland subtype (table 37), except for the second winter when one-third of the observations were in the grassland subtype (figures 27 and 28).

Spring: In 1975 the majority of observations were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type. The second spring the observations were split between the three major types, but the sample of antelope was very small (table 38).

Summer: Two-thirds of the observations were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type. The remainder of the observations were in open types, clearings or sparsely wooded areas (table 39).

Table 37. Winter use of habitat types by antelope in the Decker Coal Lease Area from 205 observations.

Habitat Types	Winter 1975 (91) ¹	Winter 1976 (114)
	H.P.I. ²	H.P.I.
Grassland Habitat Types		
Grassland Subtype	-	39 (4.33)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	100 ³ (1.43)	61 (.87)

1 Number of antelope observed

2 Habitat Preference Index

3 Percent of observations

Table 38. Spring use of habitat types by antelope on the Decker Coal Lease Area from 225 observations.

Habitat Types	Spring 1975 (193) ¹	Spring 1976 (32)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Big Sage-Grassland Subtype	-	34 (.49)
Ponderosa Pine-Juniper-Big Sage Mix Subtype	15 ³ (2.15)	-
Grassland Habitat Type		
Grassland Subtype	-	28 (3.11)
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	67 (.96)	38 (.54)
Grassland Subtype	12 (1.33)	
Alfalfa Field Subtype	3 (1.50)	
Grain Field Subtype	3 (1.0)	

1 Number of antelope observed

2 Habitat Preference Index

3 Percent of antelope observations

Habitat Preference Index

Fall: The use of the big sage-grassland subtype was about normal. Alfalfa fields showed some preference use, but grain fields had a very definite preference use with an index of 7.0 (table 36).

Winter: In 1975 the antelope used only the big sage-grassland subtype which gave it an index of 1.43. In 1976 the grassland subtype was used which showed a preference of 4.33 (table 37).

Spring: During 1975 habitat appeared to be used in relation to its availability. Only the ponderosa pine-juniper-big sage subtype showed a preference use.

The use of the big sage-grassland subtypes in 1976 was at a normal level. But the grassland subtype appeared to be preferred with an index of 3.11 (table 38).

Summer: The grassland and big sage-grassland subtypes were used at about a normal rate. The timber types appeared to be favored by the antelope with a rating of 1.33 for the ponderosa pine-juniper subtype and 10 percent of all observations were in the big sage-juniper subtype. This is not to say that the timber types are more important to the antelope than the big sage and grassland, but that they chose to use these subtypes at a greater percentage than their availability (table 39).

Table 39. Summer use of habitat types by antelope in the Decker Coal Lease Area from 110 observations.

Habitat Types	Summer 1975 (110) ¹	2
	H.P.I.	
Ponderosa Pine Habiata Type		
Grassland Park Subtype	23	(.22)
Big Sage-Grassland Subtype	8	(.11)
Grassland Habitat Type		
Grassland Subtype	1	
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	66	(.94)
Grassland Subtype	8	(.89)
Pasture Subtype	1	
Ponderosa Pine-Juniper Subtype	4	(1.33)
Big Sage-Juniper Subtype	10	(+)

¹ Number of antelope observed

² Habitat Preference Index (a + indicates substantial use but no index was calculated)

³ Percent of seasonal use

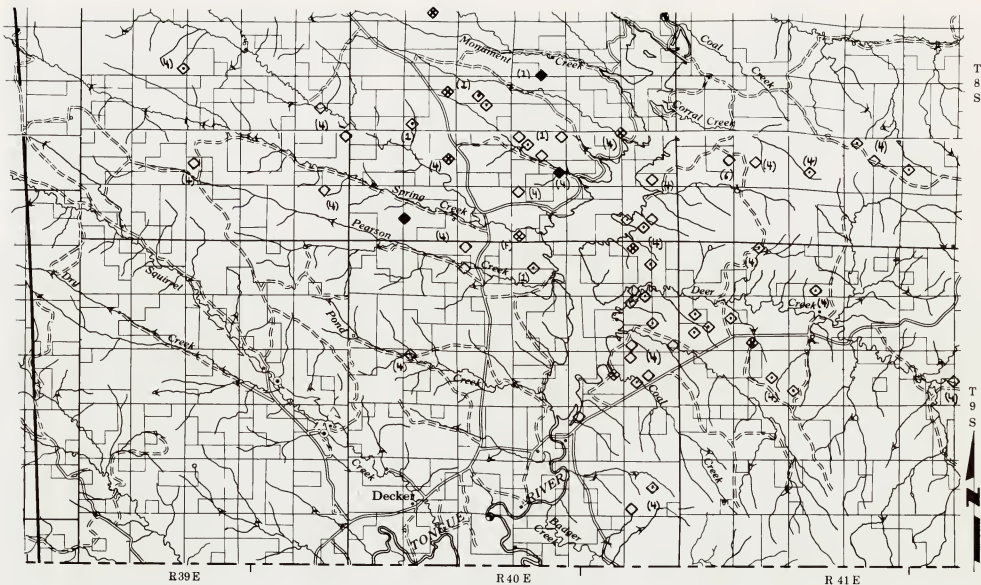


Figure 27. Pronghorn antelope distribution on the Decker Coal Lease Area. Fall 1974-Summer 1975. Numbers in parenthesis are coded habitat types.

LEGEND	
Antelope	
Plant Code	
Fall (Sept.- Nov.)	Big Sage-Grassland 4
Winter (Dec.- Feb.)	Grassland 1
Spring (Mar.- May)	Ponderosa Pine 5
Summer (June - Aug.)	Dry Farming F

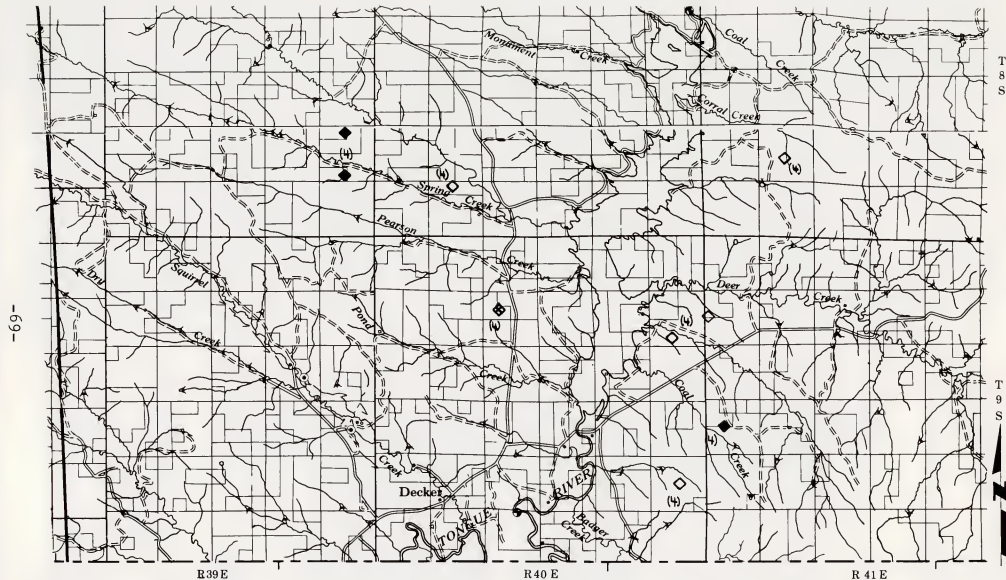


Figure 28. Pronghorn antelope distribution on the Decker Coal Lease Area. Fall 1975-Spring 1976. Numbers in parenthesis are coded habitat types.

LEGEND	
Antelope	
Fall (Sept.- Nov.)	◆
Winter (Dec.- Feb.)	◆
Spring (Mar.- May)	◇
Plant Code	
Big Sage-Grassland	◆

Canyon Creek Coal Lease Area

Mule Deer

Use of Habitat Types

Fall: Habitat use is based on a small sample size. Twenty-five percent of these observations were in the ponderosa pine-juniper-sagebrush mix subtype of the Ponderosa Pine Type (table 40). Twelve percent of the observations were in the grassland subtype of the Grassland Type, which is on the plateaus; 12 percent in the Rhus-grassland subtype and 3 percent in the grassland subtype, both of these within the Ponderosa Pine Type. These three subtypes accounted for 27 percent of the observations; therefore approximately one-fourth of the observed deer use were in some type of grassland community.

Winter: Sixty-five percent of the observations for both years were in the ponderosa pine-juniper subtype of the Ponderosa Pine Habitat Type. During the first winter another third of the deer observations were recorded in the ponderosa pine subtype (table 41). During the second winter the remaining third of the observations was in the grassland park and big sage-grassland subtypes. (Figures 29 and 30).

Spring: Most of the deer were in the Ponderosa Pine Habitat Type. Two-thirds of the observations during the first spring were in the big sage-grassland subtype. Another 18 percent of the observations were in the ponderosa pine-juniper-big sage mix subtype. The second year 45 percent were in this subtype, but this was based on a very small number of observations (table 42).

Summer: This season's habitat use was based on a small number of observations. No preference was noticeable (table 43).

Habitat Preference Index

Fall: Due to small acreages of several of the habitat subtypes in this area not all preference ratings could be obtained.

The timber types appeared to be used less than their availability. The alfalfa and pasture subtypes appeared to have a positive preference rating even though no actual index could be calculated. (Table 40).

Table 40. Fall habitat use by mule deer in the Canyon Creek Coal Lease Area from 32 observations.

Habitat Types	Fall 1974 (32) ¹ H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	12 ³ (.67)
Grassland Park Subtype	3
Rhus-Grassland Subtype	12
Big Sage-Grassland Subtype	3 (.15)
Alfalfa Field Subtype	12 (+)
Pasture Subtype	19 (+)
Ponderosa Pine-Juniper-Big Sage Mix Subtype	25 (.81)
Grassland Habitat Type	
Grassland Subtype	12

1 Number of deer observed

2 Habitat Preference Index (a + indicates substantial use but no index was calculated)

3 Percent of observations

Table 41. Winter habitat use by mule deer in the Canyon Creek Coal Lease Area from 304 observations.

Habitat Types	Winter 1975 (211) ¹ H.P.I. ²	Winter 1976 (93) H.P.I.
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	31 ³ (1.72)	-
Grassland Park Subtype	3	27
Deciduous Shrub Subtype	1	-
Ponderosa Pine-Juniper Subtype	65 (2.10)	65 (2.10)
Big Sage-Grassland Subtype	-	9 (.45)

1 Number of deer observed

2 Habitat Preference Index

3 Percent of the observations

Table 42. Spring habitat use by mule deer in the Canyon Creek Coal Lease Area from 140 observations.

Habitat Types	Spring 1975 (120) ¹	Spring 1976 (20)
	H.P.I. ²	H.P.I.
Ponderosa Pine Habitat Type		
Rhus-Grassland Subtype	3 ³	-
Big Sage-Grassland Subtype	62 (3.1)	10 (.50)
Alfalfa Field Subtype	11 (+)	-
Ponderosa Pine-Juniper -Big Sage	18 (.58)	45 (1.45)
Mix Subtype		
Grassland Park Subtype	-	25 (+)
Ponderosa Pine Subtype	-	20 (1.11)
Grassland Habitat Type		
Grassland Subtype	1	-
Rhus-Grassland Subtype	2	-
Big Sage-Grassland Habitat Type		
Alfalfa Field Subtype	3	-

1 Number of deer observed

2 Habitat Preference Index (a + indicates substantial use but no index was calculated)

3 Percent of the observations

Table 43. Summer habitat use by mule deer in the Canyon Creek Coal Lease Area from 23 observations.

Habitat Types	Spring 1975 (23) ¹
	H.P.I. ²
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	22 ³ (1.22)
Grassland Park Subtype	17
Rhus-Grassland Subtype	4
Big Sage-Grassland Subtype	22 (1.11)
Ponderosa Pine-Juniper Subtype	17 (.55)
Ponderosa Pine-Juniper-Big Sage	13
Mix Subtype	
Juniper Subtype	4

1 Number of deer observed

2 Habitat Preference Index

3 Percent of the observations

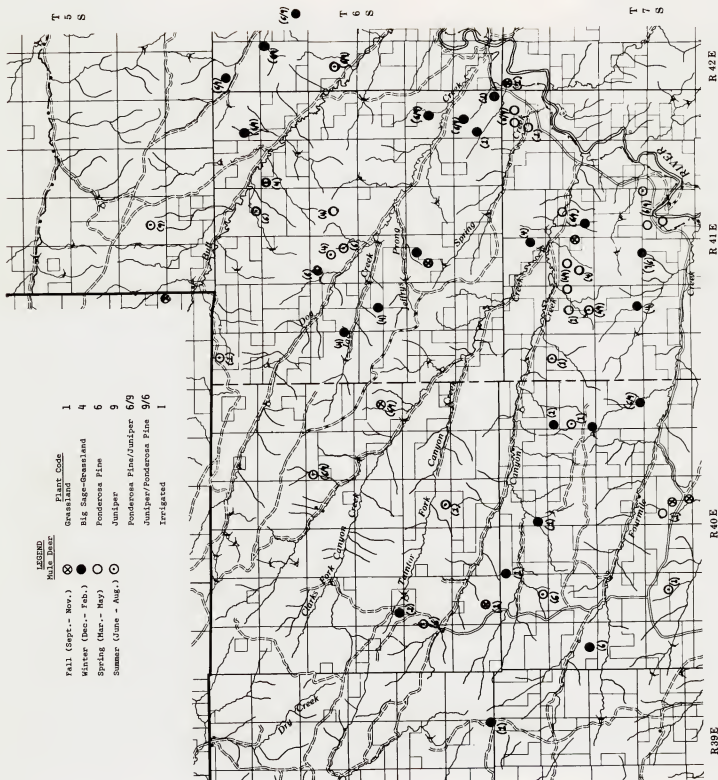


Figure 29. Mule deer distribution on the Canyon Creek Coal Lease Area. Fall 1974-Summer 1975. Numbers in parenthesis are coded habitat types.

Winter: During 1975 there was a very significant preference for timber. Sixty-five percent of the deer were in the ponderosa pine-juniper subtype with a preference rating of 2.10. Thirty-one percent of the observations were in the ponderosa pine subtype with an index of 1.72. Evidently the deer were definitely seeking out the timber habitat.

In 1976 the deer again used the ponderosa pine-juniper subtype accounting for 65 percent of the observations again with a preference rating of 2.10. However, this year, 27 percent of the observations were in the grassland park subtype. A preference index could not be calculated but it appears that this subtype also was preferred (table 41).

Spring: During the spring of 1975 the majority of the observations were in big sage-grassland parks. This gave a preference index of 3.1. Alfalfa fields were also favored.

In 1976 the grassland parks were favored. The ponderosa pine-juniper-big sage mix subtype showed some preference use. However, the sample size of animals seen was small (table 42).

Summer: No preference could be seen during this season. Sample size was very small.

Production

So few deer were observed during the fall that no ratios could be established. In the winter of 1974-1975 a ratio of 44 fawns per 100 adults was obtained. Part of the reason for this low ratio was the abundance of male deer. From what could be identified positively as bucks and does, the ratio was 1:1. This area appears to be heavily used by bucks.

Antelope

The Canyon Creek area has very little suitable antelope habitat. In the fall of 1974 only 12 antelope were seen and they were in the big sage-grassland subtype. In the winter of 1974-1975, 47 antelope were seen and 57 percent were in the big sage-grassland subtype and 43 percent in the ponderosa pine subtype of the Ponderosa Pine Type.

All Lease Areas Combined

The following topics could not be adequately assessed on a lease area by lease area basis, so the data were pooled for the entire study area.

Mule Deer

Use of Topography

Fall: During this season flat terrain accounted for 63 percent of the mule deer observations. Sidehills were second in use, comprising 19 percent of the observations (table 44).

Table 44. Mule deer use of topography.

	Plateau	Flat	Coulee	Sidehill	Ridgetop	Creek
Fall (286) ^{1/}	3 ^{2/}	63	14	19	1	-
Winter (941)						
1975	35	24	6	33	2	1
1976	18	24	4	41	5	9
Spring (307)	14	69	6	11	-	-
Summer (172)	19	27	17	27	4	5

^{1/} Number of observations

^{2/} Percent of season observations

Winter: During this season the trend was reversed. Use of plateaus increased to 35 percent the first winter, but only to 18 percent the second. The use of sidehills increased to 33 percent the first winter and 41 percent the second. Evidently deer spent more time on sidehills the second winter, forsaking the plateaus, but the trend was the same. During both winters use of flats decreased to 24 percent (table 44).

Spring: Sixty-nine percent of all the deer were observed on flats. Plateaus accounted for 14 percent of the observations and hillsides 11 percent (table 44).

Summer: Only 27 percent of the deer were observed on flats during this season as compared to 69 percent during spring. While hillsides made up only 11 percent of the observations during spring, this use now rose to 27 percent. Coulees went from 6 percent in spring to 17 percent in summer. Creek bottoms accounted for 5 percent of the deer observations (table 44).

The change in use of topography seems to show the same pattern as habitat use shifts from spring to summer. Changing from flats to sidehills and coulees coincides with leaving the sagebrush terrain for timber types and deciduous shrub subtype.

Exposures

During fall almost one-third of the deer observations were on north exposures. Eighteen percent were on east exposures. North, northeast, and east exposures accounted for 64 percent of the observations.

During winter 45 percent of the deer were on east exposures. North and west exposures each yielded 21 percent of the observations. Fifty-nine percent of all the deer were seen on east and southeast exposures. This shows a use of the warmer exposures. This observation is similar to what Dusek (1973) and Martin (1975) found.

Harvest

There was a considerable difference between deer harvests for the 1974 and 1975 deer seasons. In 1974, 103,600 deer were harvested in Montana. In 1975 this harvest had dropped to 77,000. Table 45 compares the 1974 and 1975 deer harvest for the state, eastern Montana and hunting districts 740 and 742. The deer harvest statewide dropped by about 25 percent. Most of this was due to a drop in mule deer harvest.

In 1974, fifty-eight percent of the total harvest were males and in 1975 sixty-two percent were males. Fish and Game Region 7 (Appendix, Figure 1) was more equally divided with 55 and 50 percent of the harvest males for the two years. In hunting district 742 the percentage of males in the harvest was 62 and 75 percent and in hunting district 740 it was 69 and 66 percent. It appears that male deer made up from one-half to two-thirds of the deer harvested in any given area. This is due to a tendency of hunters to select for male deer. Also, as a harvest drops the percentage of male deer will rise. This appears to be the case in hunting district 742 where the harvest decreased by half from 1974 and 1975. The percentage of bucks increased from 62 to 75 percent of the harvest.

Food Habits

Food habits of mule deer were investigated by this author in 1970 and 1971 on a section of the Custer National Forest which is included in the Birney-Decker unit. Mule deer rumens were collected from hunters during the fall of 1973 on the Custer Forest. Data from rumens collected around Colstrip have also been included, plus stomach samples collected by Biologist Charles Eustace in Rosebud County.

Fall: In September, skunkbush and dandelion (*Taraxacum* spp.) made up the bulk of the diet. In October, skunkbush

Table 45. Deer Harvest

	1974	1975
STATE:	103,600	77,000
Mule Deer	69,900	46,600
Whitetail Deer	28,400	27,000
Unidentified	5,300	3,400
Males	59,800	47,500
Antlerless	40,600	27,800
Unidentified	3,200	1,700
E. MONTANA (Region 7)	38,700	30,500
Mule Deer	26,500	18,300
Whitetail Deer	10,400	10,800
Unidentified	1,800	1,400
Males	21,200	15,300
Antlerless	16,500	14,400
Unidentified	1,000	800
HUNTING DISTRICT 742	820	413
Mule Deer	693	367
Whitetail	70	46
Unidentified	57	-
Male	506	310
Antlerless	301	103
Unidentified	13	-
HUNTING DISTRICT 740	1,006	874
Mule Deer	835	737
Whitetail Deer	106	137
Unidentified	65	-
Male	699	577
Antlerless	279	297
Unidentified	28	-

Table 46. Fall and winter food habits of mule deer within the Birney-Decker unit.

	September 3 Sites (152) ¹ (Knapp 1972)	October 31 Rumens (Field Data 1973)	November 17 Rumens (Field Data '73)	January 2 Sites (131) (Knapp 1972)	February 4 Sites (2084) (Knapp 1972)
SHRUBS					
<i>Artemisia cana</i>		1	8	35	2
<i>Artemisia tridentata</i>					38
<i>Chrysothamnus nauseosus</i>		2	2		48
<i>Juniperus scopulorum</i>			3	4	2
<i>Pinus ponderosa</i>		tr	12		
<i>Rosa arkansana</i>		1			
<i>Rhus trilobata</i>	64	36	21	50	12
<i>Symphoricarpos</i> spp.		23	13		
Unidentified shrubs		4	5		
Total Shrubs	64	67	52	101	102
FORBS					
<i>Artemisia frigida</i>	2				
<i>Aster oblongifolius</i>		2			
<i>Aster</i> spp.		1	2		
<i>Cirsium undulatum</i>		1	2		
COMPOSITAE		1	2		
<i>Medicago sativa</i>		8	7		
Mushroom		3	6		
<i>Senecio canus</i>					
RANUNCULACEAE					
<i>Taraxacum</i> spp.	33		2		
<i>Tragopogon dubius</i>			1		
<i>Yucca glauca</i>		1	1		tr
Unidentified Forbs		10	17		
Total Forbs	35	27	39	-	tr
GRAMINEAE	-	3	5	-	-

¹ Instances of use (bites)

Table 47. Spring and summer food habits of mule deer.

	Mar-May 6 Rumens (Eustace, 1971)	June 11 Sites ¹ (768) ² (Knapp 1972)	July 11 Sites (972) (Knapp 1972)	August 13 Sites (1515) (Knapp 1972)
SHRUBS				
<i>Acer negundo</i> (box elder)	7	tr		
<i>Artemisia cana</i> (silver sage)	8			
<i>Artemisia tridentata</i> (big sage)	7			
<i>Chrysothamnus nauseosus</i> (rubber rabbitbrush)	1			7
<i>Juniperus horizontalis</i> (Creeping juniper)	2			11
<i>Pinus ponderosa</i> (Ponderosa pine)	tr			49
<i>Prunus virginiana</i> (chokecherry)	1			
<i>Rosa arkansana</i> (rose)	5	12	1	
<i>Rhus trilobata</i> (skunkbush)		27	47	
<i>Symphoricarpos</i> spp. (snowberry)	8			
Unidentified shrubs	2			
Total Shrubs	41	39	48	67
FORBS				
<i>Aster occidentalis</i> (western aster)				2
<i>Aster</i> spp. (an aster)				1
<i>Astragalus</i> (milkvetch)		3	9	1
<i>Collomia linearis</i> (narrow leaved collomia)		1		
<i>Geum triflorum</i> (prairie smoke)	1			
<i>Lactuca serriola</i> (wild lettuce)		2	21	1
<i>Medicago sativa</i> (alfalfa)		4	9	23
<i>Phlox</i> spp. (phlox)	2			
<i>Senecio canus</i> (woolly groundsel)				6
RANUNCULACEA (buttercup family)	6			
<i>Tragopogon dubius</i> (salsify)	13	45	11	tr
<i>Yucca glauca</i> (soapweed)		4		
Unidentified forbs	2	1		
Total Forbs	24	60	50	34
Grass	39	-	-	1

¹ Number of feeding sites² Total instances of use (bites)

and snowberry comprised 59 percent of the diet and in November they comprised 34 percent. The November rumens also contained 8 percent silver sagebrush. Alfalfa made up 7 percent of the November food habits, and mushrooms made up 6 percent (table 46).

Winter: By January, the mule deer diet consisted strictly of shrubs. Silver sagebrush and skunkbush were predominant. In February big sagebrush and rubber rabbitbrush (*Chrysothamnus nauseosus*) totaled 86 percent of the diet (table 46).

Spring: Only two rumens were collected each month so the data have been combined. Shrubs comprised 41 percent of the spring diet of mule deer. Box elder (*Acer negundo*), silver sage, big sage, and snowberry each comprised about 7 or 8 percent of the diet followed closely by rose at 5 percent (table 47). The only forb of any importance was common salsify (*Tragopogon dubius*) comprising 13 percent of the diet. Members of the buttercup family made up another 6 percent. Grass comprised an unusually high percentage of the diet, 39 percent. Grass is the first plant group to green up in the spring. Since the new growth is succulent it is attractive to deer who have been eating dried forbs and shrubs during winter. As soon as forbs begin to appear, deer use of grass declines.

Summer: In June, skunkbush and rose were the only shrubs seen to be fed upon, comprising 27 and 12 percent of the diet, respectively. Forbs made up the bulk of the diet with common salsify comprising 45 percent. Alfalfa and soapweed both accounted for 4 percent of the June diet. In July, use of skunkbush increased to 47 percent of the forage consumed. Salsify dropped to 11 percent of this month's diet and wild lettuce provided 21 percent. Alfalfa and milkvetch each accounted for 9 percent of the diet. In August skunkbush was still the major constituent of the diet, comprising 49 percent. Rose accounted for 11 percent. Note that in June rose was 12 percent but in July only 1 percent. Chokecherry comprised 7 percent of the August diet and alfalfa 23 percent (table 47).

Antelope

Use of Topography

Fall: Seventy-three percent of the animals were observed on flats. Along with the 18 percent found on plateaus, a total of 91 percent of the observations were on level ground (table 48).

Winter: All animals were on level ground (table 48).

Table 48. Use of topography by antelope (1583 observations).

	Creek	Plateau	Flat	Coulee	Sidehill
Fall	3 ¹	18	73	-	6
Winter	-	16	84	-	-
Spring	-	-	100	-	-
Summer		15	80	1	5

¹ Percent of the observations

Spring: All antelope that were recorded as to topography were on flat terrain (table 48).

Summer: Eighty percent of the antelope were observed on flats, 15 percent on plateaus and 5 percent on hillsides (table 48).

Harvest

The statewide antelope harvest was about the same for the two years with a little drop in the total kill the second year. The drop in harvest in eastern Montana appears to be mainly caused by a drop in harvest of female antelope since the harvest of bucks increased (table 49).

Quotas for hunting districts 740 and 742 were cut drastically for 1975 because of poor production.

Production

An antelope survey was flown during the summer of 1974. In hunting district 742 production was 56 fawns per 100 does, 44 males per 100 females and 39 fawns per 100 adults. Density was about 1 antelope for every 2 square miles.

In hunting district 740 production was 56 fawns per 100 does, 38 males per 100 females and 40 fawns per 100 adults. Density was 1 antelope per 2 square miles.

Food Habits

No antelope food habits data have been collected in the Birney-Decker area; however, such food habits have been well documented in several other areas of eastern Montana.

Table 49. Antelope Harvest

	1974	1975
STATE	18,700 ¹	17,300
Male	12,200	11,700
Female	5,800	4,900
Fawns	600	700
E. MONTANA	8,380	7,850
Male	5,500	5,600
Female	2,400	1,950
Fawn	330	300
HUNTING DISTRICT 742	200	21
Male	123	14
Female	65	3
Fawn	12	4
HUNTING DISTRICT 740	70	2
Male	43	
Female	21	
Fawn		

¹ The difference between totals and the sum of males, females and fawns is the animals of unknown sex and age.

During fall, forbs comprised about 35 percent of the total forage consumed. Important forbs were alfalfa (*Medicago sativa*), three-leaved milkvetch (*Astragalus gilviflorus*), fringed sagewort and Nuttall goldenweed (*Haplopappus nuttallii*). The single most important shrub was silver sagebrush. It is interesting to note the heavy use of snowberry in the October samples (table 50).

During winter the antelope's diet was almost entirely shrubs, which comprised 93 percent of the food taken. The species consumed consisted of big sagebrush and silver sagebrush. The remainder of the diet was mostly fringed sagewort. This is strong evidence of the importance of sagebrush to antelope.

In early spring (March) antelope were still utilizing shrubs. Big sagebrush comprised 78 percent of this month's diet. Other shrubs of importance were silver sage, rubber rabbitbrush, and snowberry. The only forb utilized in this instance was fringed sagewort. In April, shrubs comprised only about half the diet. Big sagebrush comprised 15 percent of the diet while silver sage rose to 36 percent. With spring growth of forbs, two species of *Lomatium* (*Lomatium* spp.) made up 39 percent of the diet for this month, and grass comprised 2 percent. In May, big sage dropped to 12 percent of the diet. Yarrow, toadflax (*Comandra umbellata*) and *Lomatium* made up almost two-thirds of all the forage consumed (table 51).

By June, shrubs were only a trace in the diet. Fringed sage, three-leaved milkvetch (*Astragalus gilviflorus*), daisy (*Erigeron pumilus*) and yellow sweetclover (*Melilotus officinalis*) were the important forbs. Yellow sweetclover comprised a full third of the diet. By July shrubs again became significant. Big sage and rubber rabbitbrush each comprised 6 percent and rose an additional 8 percent. However, three-leaved milkvetch, alfalfa (*Medicago sativa*) and yellow sweetclover made up the bulk with yellow sweetclover comprising over one-third of the diet in itself (table 51). In August, rubber rabbitbrush comprised 12 percent of the monthly diet and big sage 8 percent. Fringed sage, longleaf sage (*Artemisia longifolia*) and yellow sweetclover made up two-thirds of the forage consumed.

White-tailed Deer

Use of Habitat Types

Fall: Use of the deciduous subtype during 1974 and 1975 was 42 and 43 percent, respectively. This would be as expected since whitetails mainly inhabit bottomlands and drainageways.

Table 50. Fall and winter food habits of antelope.

Taxa	Sept. (3) ¹ Rumens	Oct. (9) Rumens	Nov. (1) Rumen	Jan. (9) ²	Feb. (12)
SHRUBS					
<i>Artemisia cana</i>	1	35	46	19	4
<i>Artemisia tridentata</i>	tr	1		76	79
<i>Chrysothamnus nauseosus</i>	3	1			3
<i>Rosa arkaniana</i>	11	1			
<i>Sarcobatus vermiculatus</i>	10				
<i>Symphoricarpos</i> spp.		21			
Unidentified Shrubs		14			
Total Shrubs	25	73	46	95	86
FORBS					
<i>Antennaria parvifolia</i>		3			
<i>Artemisia frigida</i>	8		6	tr	11
<i>Artemisia longifolia</i>	tr				
<i>Aster</i> spp.	3			2	
<i>Astragalus gilviflorus</i>	6				
<i>Comandra umbellata</i>	tr				
<i>Haplopappus nuttallii</i>	9				
<i>Medicago sativa</i>	45				
<i>Opuntia polycantha</i>		4			
<i>Tragopogon dubius</i>	1				
Unidentified Forbs		9	48		
Other Forbs (15)	1	4			
Total Forbs	74	20	54	3	11
GRAMINEAE	tr	7		tr	2

¹ Paunch samples² Number of separate feeding sites

Table 51. Spring and summer food habits of antelope.

	March (7) ¹ (Bayless 1969)	April (8) ² (1144) ² (Campbell 1970)	May (9) (1835) (Campbell 1970)	June (6) (582) (Wentland 1968)	July (16) (1990) (Wentland 1968)	August (12) (1567) (Wentland 1968)
Taxa						
SHRUBS						
<i>Artemisia cana</i> (silver sage)	113	36				
<i>Artemisia tridentata</i> (big sage)	78	15	12		6	8
<i>Chrysothamnus nauseosus</i> (rubber rabbitbrush)	5				6	12
<i>Gutierrezia sarothrae</i> (snakeweed)			1			
<i>Rosa arkansana</i> (rose)					8	2
<i>Sarcobatus vermiculatus</i> (greasewood)			3	tr		
<i>Symphoricarpos occidentalis</i> (snowberry)	3	2				
TOTAL SHRUBS	97	53	16	tr	20	22
FORBS						
<i>Acillea millefolium</i> (yarrow)		2	19		tr	
<i>Allium textile</i> (wild onion)			tr			
<i>Antennaria parvifolia</i> (small leaf pussytoes)			tr			
<i>Arnica fulgens</i> (arnica)			2			
<i>Artemisia frigida</i> (fringed sage)	3			17	1	17
<i>Artemisia longifolia</i> (long leaf sagebrush)					3	28
<i>Aster</i> spp. (aster)			6			
<i>Astragalus gilviflorus</i> (three- leaved milkvetch)				29	12	
<i>Astragalus missouriensis</i> (Missouri milkvetch)				1		
<i>Besseyia wyomingensis</i> (kittentail)		1				
<i>Camandra umbellata</i> (toadflax)			18			
<i>Erigeron pumilus</i> (daisy)				17		
<i>Gaura coccinea</i> (gaura)					2	
<i>Lomatium foeniculaceum</i> (lomatium)		26	20			
<i>Lomatium macrocarpum</i> (lomatium)		13	5			
<i>Medicago sativa</i> (alfalfa)					12	3
<i>Melilotus alba</i> (white sweetclover)					1	4
<i>Melilotus officinalis</i> (yellow sweetclover)			1	33	35	18

Table 51 continued.

Taxa	March (7) ¹ (Bayless 1969)	April (8) ² (1144) ² (Campbell 1970)	May (9) ³ (1835) (Campbell 1970)	June (6) ³ (582) (Wentland 1968)	July (16) ³ (1990) (Wentland 1968)	August (12) ³ (1567) (Wentland 1968)
FORBS continued						
<i>Monolepis nuttalliana</i> (monolepis)			2			
<i>Opuntia polycantha</i> (prickly pear)					4	
<i>Petalostemon purpureum</i> (purple prairie clover)			tr	4		
<i>Polygonum aviculare</i> (prostrate knotweed)					5	
<i>Psoralea argophylla</i> (silverleaf scurfpea)			2			
<i>Psoralea tenuiflora</i> (slimflower scurfpea)					1	
<i>Ratibida columnifera</i> (prairie coneflower)			1			tr
<i>Tragopogon dubius</i> (common salsify)						8
<i>Vicia americana</i> (American vetch)		tr	2		tr	
Unidentified forbs		2		1	1	
TOTAL FORBS	3	45	83	100	80	78
Grass		2	1	tr		

1 Number of feeding sites

2 Total instances of use (bites)

3 Percentage of diet

The ponderosa pine subtype accounted for 22 and 19 percent of the observations for both years. The very adaptable whitetail is obviously making substantial use of the upland timber type. It is interesting to note that during 1975 upland vegetation accounted for 57 percent of the observations. Thus, white-tailed deer range includes more than just the deciduous shrub subtype of the bottomlands (tables 52).

During 1974, however, over one-third of the observations were in alfalfa fields. Whitetails utilize alfalfa fields and haystacks to a much greater extent than mule deer.

Winter: During the first winter 87 percent of the observations were in the deciduous shrub subtype of the Ponderosa Pine Type. In the second year, 71 percent of the observations were in the deciduous shrub subtype and 12 percent more in the adjacent alfalfa fields. During this time of year whitetails have a tendency to "yard up" and occupy relatively small areas of bottomland. Use of timber also made up a significant part of the habitat use (table 53).

No spring and summer data were available.

Use of Topography

Fall and Winter: During the fall 52 percent of the deer were observed on hillsides. The use of flats and creeks were 29 and 19 percent, respectively (table 54). During winter the majority of sightings were on flat land, in other words, along drainages.

Harvest

In 1974 approximately 28,400 whitetails were killed in Montana with 10,400 of those in eastern Montana. In 1975 approximately 27,400 whitetails were harvested statewide with 10,800 in eastern Montana. Up to and including the 1973 deer season whitetails accounted for almost 20 percent of the deer harvest (table 45). While the number of whitetails harvested had been increasing, the proportion they represented in the total harvest had not increased because the mule deer harvest had been growing proportionately. But starting with the 1974 season whitetails have begun to play a larger role. During this season whitetails accounted for 27 percent of the harvest and in 1975, 35 percent.

Table 52. Use of habitat types by whitetail in fall from 57 observations.

Habitat Types	Fall 1974 (36) ¹	Fall 1975 (21)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	22 ²	19
Deciduous Shrub Subtype	39	43
Alfalfa Field Subtype	28	-
Pasture Subtype	-	19
Big Sage-Grassland Subtype	-	19
Big Sage-Grassland Habitat Type		
Deciduous Shrub Subtype	3	-
Alfalfa Field Subtype	8	-

¹ Number of deer observed

² Percent of the observations

Table 53. Use of habitat types by whitetails during winter from 140 observations.

Habitat Types	Winter 1974-75 (88) ¹	Winter 1975-76 (52)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	11 ²	10
Deciduous Shrub Subtype	87	71
Alfalfa Field Subtype	-	12
Ponderosa Pine-Juniper Subtype	-	8

¹ Number of deer observed

² Percent of the observations

Table 54. Use of topography by whitetails from 108 observations.

Topography	Fall	Winter
Hillside	52 ¹	13
Flat	29	87
Creek	19	-

¹ Percent of season observations.

Production

Whitetail productivity is rated as excellent in southeastern Montana, and it has been improving for the last several years. In general the fawn per adult ratio has been increasing steadily from a ratio of 55 fawns per 100 adults in 1969 to 122 fawns per 100 adults in 1973 (Eustace 1974).

Food Habits

Stomach samples from whitetails collected from the Missouri River bottomlands showed that browse was the most important forage during all seasons except summer. Preferred browse plants included chokecherry, serviceberry, skunkbush sumac and snowberry. Other browse plants included wild rose, green rabbitbrush (*Chrysothomus viscidiflorus*), greasewood, buffalo berry (*Shepherdia argentea*), and various species of sagebrush. Western snowberry was the single most important plant in the year-long diet. Alfalfa and grain were important when available (Allen 1971).

Three whitetail rumens were collected from hunters in the fall of 1973. Two were from Colstrip and one from the Holiday Springs campground of the Custer National Forest. One of the Colstrip rumens contained 79 percent snowberry, with grass comprising another 14 percent. In the other Colstrip rumen, snowberry made up 44 percent of the diet. Skunkbush was second, comprising 33 percent and unidentified browse third, with 16 percent. From the Custer National Forest rumen, snowberry made up 36 percent of the diet and alfalfa 35 percent. This was followed by mushroom, comprising 12 percent of the sample. These three samples enforce Allen's (1971) statement that snowberry is an important browse species for whitetail.

Sharp-tailed Grouse

Use of Habitat Types

Observations for all lease areas were combined so as to provide a larger sample size. Figures 31-35 show small game distribution.

Fall: Habitat choice by sharp-tailed grouse (*Pedioecetes phasianellus*) during the fall was varied. Habitat selection for the two years varied not so much in types chosen but in the intensity of use.

The major habitats utilized the two years were alfalfa fields, grassland and big sage-grassland subtypes. In 1974 alfalfa fields accounted for 26 percent of the observations and in 1975, 37 percent. Grassland accounted for 14 percent of the observations in 1974 and 22 percent in 1975. Big sage-grassland held 13 percent of the observations in 1974 and 24 percent in 1975 (table 55).

Winter: As can be seen from table 56 the habitat use between the two winters was very different. In 1975, eighty-three percent of the observations were in the Ponderosa Pine Habitat Type with 45 percent of the total observations in the ponderosa pine subtype. In 1976 only 57 percent of the observations were in the Ponderosa Pine Habitat Type. Forty-seven percent of the birds were in the deciduous shrub subtype. There was more use of the Big Sage-Grassland Type this year than last, about 43 percent of the total observations.

Spring: During this season the majority of sharptails were found in the open types. In 1975 forty percent of the observations were in the big sage-grassland subtype and 38 percent in the grassland subtype (table 57). In 1976 eighty-one and 13 percent of the observations were in the grassland and big sage-grassland subtypes, respectively. The major reason for the difference in habitat use between the two years was the survey method. In 1975, the entire study area was covered, but in 1976 most of the effort was directed toward Otter Creek.

Summer: The big sage-grassland subtype accounted for almost half of the apparent habitat use in summer. Roadside vegetation accounted for 20 percent of the observations (Table 58).

Table 55. Habitat use by sharptails during fall from 466 observations.

Habitat Types	Fall 1974 (182) ¹	Fall 1975 (284)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	17 ²	4
Grassland Park Subtype	1	3
Big Sage-Grassland Subtype	1	-
Deciduous Shrub Subtype	-	6
Alfalfa Field Subtype	11	33
Ponderosa Pine-Juniper Subtype	1	-
Pasture Subtype	16	-
Grassland Habitat Type		
Grassland Subtype	9	19
Roadside Vegetation Subtype	-	2
Deciduous Shrub Subtype	-	1
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	12	24
Grassland Subtype	4	-
Deciduous Shrub Subtype	1	2
Silver Sage Subtype	5	-
Roadside Vegetation Subtype	7	-
Alfalfa Field Subtype	15	4
Greasewood Subtype	-	2

¹ Number of birds observed

² Percent of observations

Use of Topography

During fall sharptails were dispersed. The majority of birds were on flat terrain. During winter birds go into more protective cover and were found most often on plateaus. In spring they were again found on flats, mainly on their dancing grounds. By summer the birds were spread out as in fall. The sharptail is basically a bird of open, fairly level terrain (table 59).

Harvest

During the 1974 hunting season 23,438 sharptails were harvested in Fish and Game Region 7 of eastern Montana. In Rosebud, Powder River and Bighorn Counties 1873, 1384, and 896 sharptails were harvested, respectively.

Table 56. Habitat use by sharptails during winter from 391 observations.

Habitat Types	Winter 1975 (256) ¹	Winter 1976 (135)
Ponderosa Pine Habitat Types		
Ponderosa Pine Subtype	45 ²	1
Grassland Park Subtype	2	
Big Sage-Grassland Subtype	9	
Ponderosa Pine-Juniper Subtype	4	
Roadside Vegetation	18	8
Alfalfa Field Subtype	5	1
Deciduous Shrub Subtype	-	47
Grassland Habitat Type		
Grassland Subtype	4	-
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	13	15
Grassland Subtype	-	2
Deciduous Shrub Subtype	-	2
Roadside Vegetation Subtype	-	11
Ponderosa Pine Subtype	-	13

¹ Number of sharptails observed

² Percent of observations

Table 57. Habitat use by sharptails during spring from 285 observations.

Habitat Types	Spring 1975 (173) ¹	Spring 1976 (112)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	-	6
Grassland Park Subtype	14 ²	-
Agricultural Subtype	5	-
Roadside Vegetation Subtype	1	-
Ponderosa Pine-Juniper- Big Sage Mix Subtype	1	-
Grassland Habitat Type		
Grassland Subtype	24	81
Big Sage-Grassland Subtype	-	10
Roadside Vegetation Subtype	1	-
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	40	3
Alfalfa Field Subtype	7	-
Grain Field Subtype	4	-
Ponderosa Pine Subtype	4	-

¹ Number of sharptails observed

² Percent of observations

Table 58. Habitat use by sharptails during summer from 87 observations.

Habitat Type	Summer 1975 (87) ¹
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	11 ²
Grassland Park Subtype	3
Roadside Vegetation Subtype	7
Grassland Habitat Type	
Grassland Subtype	5
Big Sage-Grassland Subtype	6
Roadside Vegetation Subtype	6
Silver Sage Subtype	7
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	43
Silver Sage Subtype	2
Roadside Vegetation Subtype	7
Pasture Subtype	3

¹ Number of sharptails observed

² Percent of observations

Table 59. Sharptail seasonal use of topography from 451 observations.

	Plateau	Flat	Hillside	Meadow	Road
Fall	27 ¹	51	6	16	-
Winter	74	26	-	-	-
Spring	18	82	-	-	-
Summer	26	59	-	-	16

¹ Percent of season's observations

During the 1975 season 16,302 sharptails were harvested. This is quite a drop from the year before, but it was not due to a lack of birds. Nineteen seventy-five had one of the best sharptail crops in many years. Obviously, hunting pressure was less. In general, bird hunting is light in southeastern Montana.

Food Habits

Food habits of sharptails are quite varied. In a study conducted in Canada (Pepper 1972), approximately 27 different species of plants and animals were consumed. The most important species eaten were wheat (*Triticum aestivum*), dandelion leaves, barley (*Hordeum vulgare*), oats (*Avena sativa*), black bindweed (*Polygonum convolvulus*) seeds, wood's rose (*Rosa woodsii*), western snowberry, grass leaves and fringed sagewort leaves.

From a study in South Dakota (Hillman and Jackson 1973), cultivated crops were first in importance for summer, fall and winter. Grasshoppers were the most important insects during summer, fall and winter.

Fall and Winter: A few sharptail crops were collected in Rosebud County during the fall and winter of 1973-74. Of the two crops from birds killed in the fall, one was mainly full of ponderosa pine seeds and some skunkbush berries. The other crop was half full of grass. An unidentified plant composed one-third of the contents of this second crop and dandelion comprised 16 percent of the crop contents.

Five sharptail crops were obtained during the winter of 1974. One was empty and two others had very little in them, but what was there was mainly green grass. A fourth crop was completely skunkbush berries. The last crop had about 20 percent skunkbush berries and rosehips and 80 percent galls from big sagebrush plants (table 60).

Spring and Summer: Pepper (1972) has some data on summer food habits of chicks. "Animal material composed all food taken by chicks until two weeks of age and other foods made up only 14 percent by volume of the three to four week old's diet. For chicks from five to ten weeks of age, animal material still comprised approximately 60-70 percent of total food by volume. Plant material, largely comprising cultivated crops and weedy species constituted a rapidly increasing percentage of chick food in the older age classes, grasshoppers (ORTHOPTERA), Beetles (COLEOPTERA), leaf hoppers (HOMOPTERA) and various HYMENOPTERANS including ants, wasps and bees were the most important animal foods

Table 60. Fall and winter food habits of sharptail grouse from seven crops.

Crops	FALL		WINTER				
	#1	#2	#1	#2	#3	#4	#5
Green Grass	-	50 ¹	-	100	100	-	-
Galls on Big Sage	-	-	-	-	tr	-	80
Skunkbush Berries	25	-	-	-	-	100	15
Rose Berries	-	-	-	-	-	-	5
Dandelion	-	16	-	-	-	-	-
Unidentified Plant	-	33	tr	-	-	-	-
Ponderosa Pine Seeds	70	-	-	-	-	-	-
Chokecherry Berries	5	-	-	-	-	-	-

¹ Percent of total volume

over all. Of the vegetative material, hard wheat (*Triticum aestivum*) and green leaves were of the most importance... rose, snowberry and wild buckwheat (*Polygonum* spp.) berries or seeds were less important volumetrically but occurred frequently in gizzards."

Hillman and Jackman's (1973) work in South Dakota showed adult sharptails preferring dandelions in spring. This was followed in importance by cultivated crops. Alfalfa, rose, crickets and grasshoppers were also important.

By summer, grasshoppers were number one in the diet followed closely by cultivated crops. Rose, prickly lettuce, alfalfa, dandelion, western snowberry and goatsbeard were also significant. Hillman and Jackson (1973) stated that "preference was indicated for rose hips, snowberry, and prickly lettuce. Short-horned grasshoppers were consumed in approximate proportion to their availability."

Breeding Areas

During the spring of 1975 much time was spent locating sharptail dancing grounds. Twenty-four such grounds were located. Often the birds winter close to breeding areas. According to Brown (1967), hens often nest within one-half mile of the breeding ground, and they have brood ranges of 0.6 to 1.25 miles from the ground for up to eight weeks of brood development. In various banding studies where sharptails are killed due to predation or hunting the birds are often found no more than one to two miles from their dancing ground.

Known sharptail grounds in the Birney-Decker area are listed in table 61. Figures 31-35 give breeding ground distribution.

Some grounds are called "satellite grounds" meaning they are extra grounds only used during years of high grouse populations. By watching these breeding areas and checking the number of birds per ground and the use of satellite grounds, biologists can establish trends in grouse populations and expected productivity.

In 1974 the young per brood in Region 7 was 6.2, just slightly below the 10 year average of 6.4. In 1975, young per brood was 6.6. The 1974 juveniles per adult ratio was 2.3, just slightly under the 15 year average of 2.4. In 1975 it was 2.1.

Sage Grouse

Use of Habitat Types

Fall: During the fall of 1974 all observations of sage grouse (*Centrocercus urophasianus*) were in the Big Sage-Grassland Habitat Type (table 62). The majority of these observations were in the big sage-grassland subtype and alfalfa fields. In 1975, with few observations, the habitat use was different except that over half the observations were in alfalfa fields. Significant use of pasture was also recorded. Much of the sage grouse use of habitats during fall is in response to a search for green vegetation. Alfalfa fields, certain spots in pastures, fencelines and roadsides are spots where green vegetation may still be found.

Winter: During the first winter only 18 birds were observed and these were in a patch of silver sage. The second winter is more representative with 371 observations all in dense big sagebrush-grassland habitat (table 63). Sage grouse depend entirely on sagebrush this time of year for cover and all their food. Figure 33 shows a wintering-breeding complex in the Hanging Woman Lease Area.

Spring: Habitat use for this season was the same as the winter, 100 percent big sage-grassland (table 63). These birds usually use the same areas for breeding as they winter in.

Table 61. Sharptail dancing grounds.

Ground Number	Date Located	Approximate Number Birds (1975)
1	March 5, 1975	12
9	March 31, 1974	13
10	April 3, 1974	11
11	April 5, 1974	3
12	April 5, 1974	18
37	March 21, 1975	8
38	March 25, 1975	12
39	April 2, 1975	22
40	April 2, 1975	7
41	April 3, 1975	12
42	April 4, 1975	20
43	April 14, 1975	4
44	April 14, 1975	7
45	April 19, 1975	32
46	March 11, 1974	12
47	May 1, 1975	12
48	May 1, 1975	8
49	May 1, 1975	5
50	May 1, 1975	8
51	May 14, 1975	14
52	May 14, 1975	9
53	May 14, 1975	4
54	May 3, 1975	12
56	June 6, 1975	5

The average number of birds per ground was 11. The number of birds seen on a ground depends on various factors such as time of day, weather and amount of disturbance. Most of the birds seen are males but to accurately determine the number and sex of birds using a ground, each ground should be checked several times each season.

Figure 36 shows a typical sharptail ground. It is usually a small rise or knoll in an open area with good visibility. Figure 37 is a closeup of the ground showing the shortness and sparseness of the vegetation.

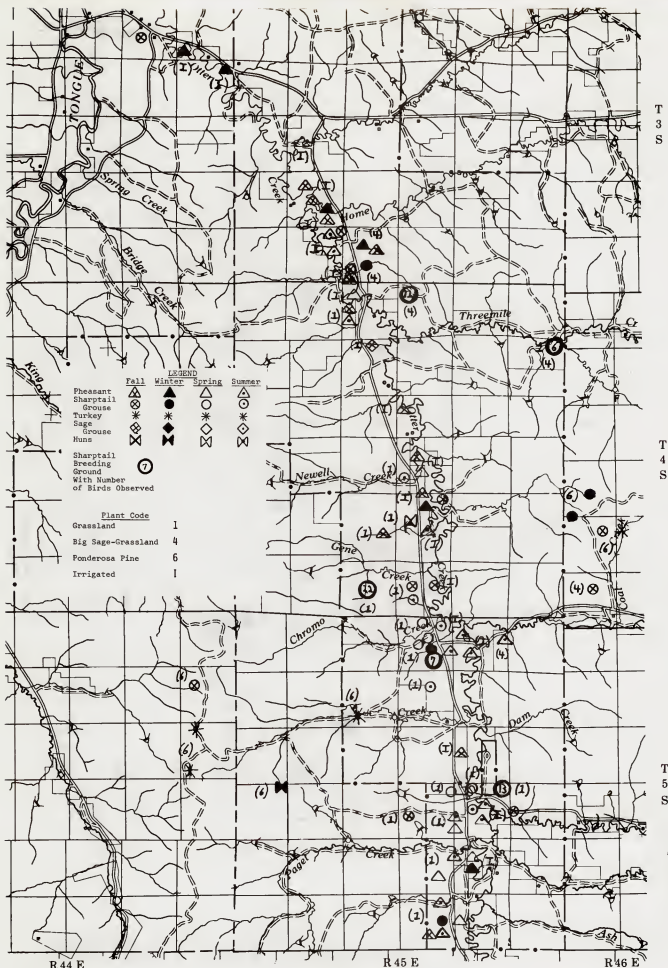
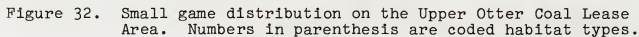


Figure 31. Small game distribution on the Ashland Coal Lease Area. Numbers in parenthesis are coded habitat types.



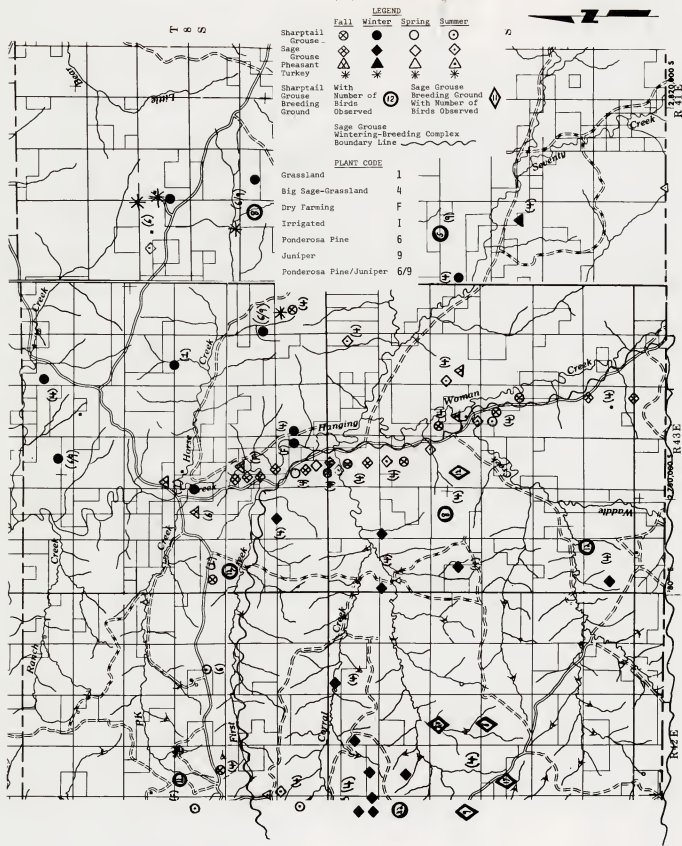


Figure 33. Small game distribution on the Hanging Woman Coal Lease Area. Numbers in parenthesis are coded habitat types.

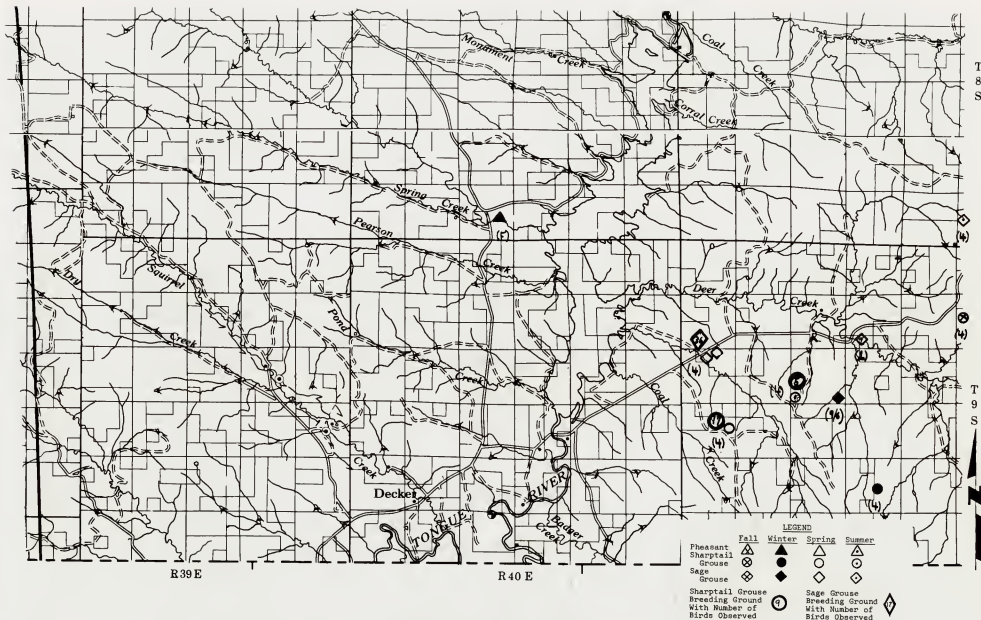


Figure 34. Small game distribution on the Decker Coal Lease Area. Numbers in parenthesis are coded habitat types.



Figure 36. The hill in the foreground is a typical example of a sharptail dancing ground.



Figure 37. Closeup of a sharptail ground. Vegetation is short and sparse.

Table 62. Habitat use by sage grouse during fall from 146 observations.

Habitat Types	Fall 1974 (106) ¹	Fall 1975 (40)
Grassland Habitat Type		
Roadside Vegetation Subtype	-	13
Alfalfa Field Subtype	-	8
Pasture Field Subtype	-	25
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	38 ²	-
Alfalfa Field Subtype	39	45
Pasture Subtype	-	10
Grain Field Subtype	9	-
Silver Sage Subtype	14	-

¹ Number of sage grouse observed

² Percent of the yearly observations

Table 63. Habitat use by sage grouse during winter and spring for 809 observations.

Habitat Types	Winter'75 (18) ¹	Winter'76 (371)	Spring'75 (157)	Spring'76 (263)
Big Sage-Grassland Habitat Type				
Big Sage-Grassland Subtype	-	100	100	100
Silver Sage Subtype	100 ²	-		

¹ Number of sage grouse observed

² Percent of annual observations

Summer: Sage grouse disperse into various habitats for the summer (table 64). One third of the observations were in the silver sage subtype. This was followed by the big sage-grassland subtype with 29 percent of the observations. The greasewood subtype accounted for a surprisingly large proportion, 19 percent. Notice that the habitat types are different from many of those used in fall.

Table 64. Habitat use by sage grouse during summer from 128 observations.

Habitat Types	Summer 1975 (128) ¹
Ponderosa Pine Habitat Type	
Silver Sage Subtype	5 ²
Grassland Habitat Type	
Grassland Subtype	7
Greasewood Subtype	19
Big Sage-Grassland Habitat Type	
Big Sage-Grassland Subtype	29
Deciduous Shrub Subtype	13
Silver Sage Subtype	27

¹ Number of sage grouse observed

² Percent of observations

Harvest

During the 1974 hunting season 7,165 sage grouse were harvested in Fish and Game Region 7 of eastern and south-eastern Montana. Rosebud, Powder River and Big Horn Counties yielded 1,364, 234, and 814 sage grouse, respectively.

During the 1975 hunting season 5,750 sage grouse were harvested in the Fish and Game Region 7 area of eastern and southeastern Montana. Rosebud, Powder River and Big Horn yielded 1,482, 67, and 780 sage grouse, respectively.

Food Habits

Martin and Pyrah (1971) stated that various species of sagebrush provide the bulk of the sage grouse diet in fall and winter and that big sagebrush comprises nearly 100 percent of the winter diet. Patterson (1952) stated, "the year-round diet of adult grouse was comprised of nearly 96 percent plant material. Only during the summer months does sagebrush compose less than 80 percent of the total volume of food consumed."

The year round average diet of adult sage grouse, as determined from 299 crops consisted of 97 percent vegetable and 3 percent animal matter (Wallestad et al. 1975). Sagebrush comprised 62 percent of the volume of all foods consumed throughout the year. During the months of December, January and February sagebrush was the only food item found in all crops, and only during the months of June, July, August and September did sagebrush make up less than 60 percent of the diet (Wallestad 1975).

Use of fringed sagewort began in March and continued through November, comprising a greater percentage of the annual diet than any other forb (Wallestad 1975).

In Montana, May and October are considered transitional months when sage grouse exhibit major changes in food habits. In May they shift from a diet of sagebrush to one dominated by forbs and in October they shift back to sagebrush. Palatability and availability of forbs appears to be the reason for shifts (Wallestad 1975).

Big sagebrush is without doubt the most important item in the diet of sage grouse. But during spring and summer forbs do contribute significantly to the diet. Peterson (1969) studied the summer food habits of juvenile sage grouse in southcentral Montana. He found dandelion and salsify to be the two most important plant items in the diet. Five other commonly utilized plants appeared to be more periodic in their occurrence in the diets of chicks. Prairie pepperweed (*Lepidium densiflorum*) was very important in the younger age classes. Fringed sagewort, curlcup gumweed, prickly lettuce, and alfalfa were not utilized to any extent until the fifth or sixth week. Animal matter, primarily insects, was the most important constituent of the diet during the first week of age. Grasshoppers, beetles and ants were the most important insects.

Breeding Areas

During the spring of 1975 nine sage grouse strutting grounds were located. The following is a list of these grounds. Figures 31-35 show approximate distribution. Most of these grounds were discovered by plane which accounts for the approximate count on several grounds.

The young per brood ratio in 1974 was 4.6, slightly below the 10 year average of 4.8. Eighty-five percent of the hens observed had broods. The juvenile per adult ratio was 1.3 in 1974, below the 15 year average of 1.7. In 1975, production was lower with 4.0 young per brood and 1.4 juveniles per adult.

<u>Ground Number</u>	<u>Date Located</u>	<u>Number Birds</u>
2	March 24, 1975	16
2 rechecked	April 20, 1975	19 males, 17 females
3	April 19, 1975	1 male, 8 females
4	May 3, 1975	Approximately 20
5	April 4, 1975	6
6	April 4, 1975	17
7	May 1, 1975	Approximately 12
8	May 14, 1975	Approximately 25
9	May 14, 1975	6 males, 1 female
10	May 14, 1975	Approximately 7

Pheasant

Use of Habitat Types

Fall: Ring-necked pheasant (*Phasianus colchicus*) habitat use shows much the same trend for the two years. Deciduous shrub and alfalfa fields are the two adjacent habitats that appear to fill pheasant's requirements. In 1974 deciduous shrub accounted for 29 percent of the observations and in 1975 for 20 percent. Alfalfa fields represented 66 percent of the use in 1974 and 43 percent in 1975. This second fall 26 percent of the birds were seen in grain fields (table 65).

Table 65. Habitat use by pheasants in fall from 213 observations.

<u>Habitat Types</u>	<u>Fall 1974</u> (99) ¹	<u>Fall 1975</u> (114)
Ponderosa Pine Habitat Type		
Deciduous Shrub Subtype	19 ²	18
Alfalfa Field Subtype	38	43
Roadside Vegetation Subtype	1	5
Pasture Subtype	1	-
Grain Subtype		26
Grassland Habitat Type		
Roadside Vegetation Subtype	-	5
Greasewood Subtype	-	1
Deciduous Shrub Subtype	-	2
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	1	-
Deciduous Shrub Subtype	10	-
Alfalfa Field Subtype	28	-
Greasewood Subtype	1	-

¹ Number of pheasants observed

² Percent of annual observations.

Winter: Habitat use during winter is about the same as fall. In 1975, fifty-eight percent of the observations were in the deciduous shrub subtype, 26 percent in alfalfa, and 13 percent along roadsides. In 1976, fifty-two percent of the observed pheasants were in alfalfa fields, 31 percent in grain fields and 9 percent in deciduous shrub (table 66).

Table 66. Habitat use by pheasants in winter from 553 observations.

Habitat Types	Winter 1975 (132) ¹	Winter 1976 (421)
Ponderosa Pine Habitat Type		
<i>Rhus</i> -Grassland Subtype	42	-
Deciduous Shrub Subtype	50	9
Alfalfa Field Subtype	9	52
Roadside Vegetation Subtype	13	1
Grain Field Subtype	-	31
Pasture Subtype	-	5
Big Sage-Grassland Habitat Type		
Roadside Vegetation Subtype	-	1
Deciduous Shrub Subtype	8	-
Alfalfa Field Subtype	17	-

- ¹ Number of pheasants observed
² Percent of observations

Spring: There were so few pheasants observed during this season that table 67 shows only the more diverse habitats used by pheasants during this season rather than any preference.

Summer: It appears that roadside vegetation is important at this time of year. Forty-seven percent of the observations were in this subtype. Pheasants are probably drawn to the green weedy cover as a food supply. Also, a significant percentage of pheasants may nest in surrounding roadside vegetation. Another 48 percent of the observations were in deciduous and agricultural subtypes (table 68).

Food Habits

Fall: Food habits of pheasants in Montana are quite varied. Hiatt (1947) found 13 plant species in their year-round diet. Cultivated grains made up the major portion of the diets,

Table 67. Habitat use by pheasants in spring from 29 observations.

Habitat Types	Spring 1975 (9) ¹	Spring 1976 (20)
Ponderosa Pine Habitat Type		
Rhus-Grassland Subtype	11 ²	-
Deciduous Shrub Subtype	22	20
Big Sage-Grassland Subtype	11	-
Roadside Vegetation Subtype	44	-
Alfalfa Field Subtype	-	10
Grassland Habitat Type		
Roadside Subtype	11	10
Grassland Subtype	-	5
Pasture Subtype	-	5
Greasewood Subtype	-	30
Ponderosa Pine Subtype	-	5
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	-	5
Silver Sage Subtype	-	10

¹ Number of pheasants observed

² Percent of observations

Table 68. Habitat use by pheasants in summer from 108 observations.

Habitat Types	Summer 1975 (108) ¹
Ponderosa Pine Habitat Type	
Deciduous Shrub Subtype	20 ²
Roadside Vegetation Subtype	28
Agricultural Subtype	19
Grassland Habitat Type	
Grassland Subtype	3
Big Sage-Grassland Subtype	1
Greasewood Subtype	1
Big Sage-Grassland Habitat Type	
Deciduous Shrub Subtype	9
Roadside Vegetation Subtype	19

¹ Number of pheasants observed

² Percentage of observations

followed by cutworms, grasshoppers, snowberry seeds, beans and field crickets. Hiatt's food habits study was conducted in the highly agricultural portion of the Bighorn Valley. Pheasant populations in regions of less intensive agriculture such as the Birney-Decker area, have to depend more on naturally occurring food supplies. In the fall of 1973, sixteen crops were collected from pheasants. False flax (*Camelina* spp.) seeds composed 26 percent of the diet. Another 25 percent of the diet was made up of a seed whose identity remains unknown. Wild oats composed 17 percent of the diet. Chokecherry, ponderosa pine seeds, and alfalfa composed 5.5 and 9 percent of the diet, respectively. The only animal component was grasshoppers at 5 percent.

Winter: Only one full crop was collected during the winter of 1973-1974. This contained 27 percent alfalfa leaves and seed and 12 percent of the unknown seed mentioned above. The other 61 percent was unidentifiable items.

Spring: In March, Hiatt (1947) found that wheat, barley and oats made up 73 percent of the diet. Some of the natural food utilized was Russian thistle (*Salsola pestifer*), grasshopper eggs and pods and prickly lettuce root fragments. In April, wheat, barley, and great burdock comprised 70 percent of the diet. Sweetclover comprised another eight percent and chokecherry 7 percent. In May, wheat, barley, and corn accounted for 47 percent of the diet. Dinky cutworm (*Feltia ducens*) comprised 19 percent of the food taken.

Summer: By June wheat and barley were 60 percent of the diet (Hiatt 1947). Natural foods were dinky cutworm 3 percent, grasshopper nymphs 2 percent, dandelion 1 percent and earthworm 1 percent.

In July wheat, barley and beans made up 75 percent of the diet. Grasshopper nymphs comprised 5 percent.

By August wheat and barley were 58 percent of the diet. Grasshoppers were 9 percent, yellow bristlegrass (*Setaria lutescens*) 7 percent, pea 6 percent, wild oats 4 percent, common sunflower (*Helianthus annuus*) 3.3 percent, and field cricket nymphs 2.4 percent.

Production

Pheasant crow count routes were run on Otter Creek and the Tongue River from Birney to Ashland in 1974, 1975 and 1976. The total number of pheasant "crows" heard during a two minute period is recorded for each stopping point (one mile intervals) along the route. The resulting figure provides an index to the male pheasant population. An average number of calls per two minute stop ranging between 10 and 20 is indicative of a fair to good pheasant population.

The Tongue River was surveyed for pheasants between Birney and Ashland. In 1974 this section of river had a crow count of 6.7, in 1975 it was 7.7, in 1976 it was 12.0 and in 1977 it was 17.8. The pheasant population appears to be on the increase.

On Otter Creek in 1971 and 1972, the crow count was 11.0 and 19.9, respectively. Then in 1974 it was 23.7. This is excellent and shows a dramatic increase in the population. But in 1976 the count had dropped to 10.0. This may not be representative of the creek since this count was only run once and the route was only 11 miles of the creek. In April of 1977 the count was 24.4.

In 1974 in Region 7, the young per brood ratio of 6.3 was below the 10 year average of 6.8. Of the hens observed, 91 percent had broods. In 1975 the average brood size was 8.1, the highest production in 7 years.

Harvest

During the 1974 hunting season 5,933 pheasants were harvested in eastern and southeastern Montana. In Rosebud, Powder River and Big Horn Counties 773, 875, and 672 pheasants were harvested. For every adult cock harvested, 5.2 juvenile cocks were killed.

In 1975, 6,875 pheasants were harvested in Fish and Game Region 7 of eastern Montana. In Rosebud and Powder River Counties 891 and 869 pheasants were harvested.

Gray Partridge

Use of Habitat Types

Fall: Almost half of the gray partridge (*Perdix perdix*) observations were in the Big Sage-Grassland Habitat Type with most of the observations in the big sage-grassland subtype. Forty-one percent of the total observations were in the Ponderosa Pine Habitat Type, divided among the grassland, roadside, and pasture subtypes (table 69).

Winter: Forty-three percent of the observations were in roadside vegetation. Thirty-six percent were in alfalfa fields and the remaining 21 percent were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type (table 69).

Harvest

During the 1974 hunting season 3,358 huns were harvested in Fish and Game Region 7 of eastern and southeastern Montana.

In Rosebud, Powder River and Big Horn Counties, 254, 71 and 102 huns were harvested, respectively.

In 1975, 2,229 huns were harvested in Region 7. In Rosebud, Powder River and Big Horn Counties, 167, 22, and 591 huns were harvested, respectively.

The production in 1974 was 10 young per brood, about average. The juveniles per adult ratio was 3.0. In 1975 the juveniles per adult ratio was 4.7.

Table 69. Seasonal habitat use by gray partridge from 166 observations.

Habitat Types	Fall 1975 (119) ¹	Winter 1975 (47)
Ponderosa Pine Habitat Type		
Grassland Park Subtype	16 ²	-
Roadside Vegetation Subtype	13	34
Pasture Subtype	12	-
Alfalfa Field Subtype	-	19
Grassland Habitat Type		
Grassland Subtype	12	-
Roadside Vegetation Subtype	-	9
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	37	21
Ponderosa Pine Subtype	-	-
Alfalfa Field Subtype	10	17

¹ Number of huns observed

² Percentage of seasonal observations

Merriams Turkey

Historical records indicate Merriams turkey (*Meleagris gallopava*) was not native to Montana. The successful transplants of wild-trapped Merriam's turkeys in Wyoming and South Dakota encouraged the Montana Department of Fish and Game to undertake a similar project in 1954. After evaluation of turkey habitat in Colorado and South Dakota, Merriam's turkeys were released in three selected areas of Montana.

In October 1956 and January 1957, a total of 26 birds was released in the Beaver Creek area near Ashland. These introductions flourished and provided huntable populations as well as transplanting stock for additional flocks.

Turkeys have been most successful in forest such as the Long Pines where about one-half the cover consists of ponderosa pine with the remainder grasses, deciduous trees and brush, in scattered small openings and drainageways throughout the forest. Very large open areas in the forest appear to have little value, as turkeys seldom venture far from the cover around the edge of openings.

Groups of turkeys were observed four times, three times in the fall of 1974 and once in the winter of 1975. The four groups contained 5, 30, 20, and 14 turkeys, respectively. All observations were within the boundaries of the Ashland Division of the Custer National Forest in the Ponderosa Pine Habitat Type.

During the fall of 1975 three flocks of turkeys were seen. In September, approximately 24 turkeys were seen in the Ponderosa pine subtype of the Ponderosa Pine Habitat Type. In October, three gobblers were spotted in a grassland park of the Ponderosa Pine Habitat Type. In November, 17 females and young were seen in the ponderosa pine subtype of the Ponderosa Pine Habitat Type.

In December, three turkeys were seen in a ranch yard within the Ponderosa Pine Habitat Type and later the same day one female was seen in the ponderosa pine subtype of the Custer Forest.

On January 20, 1976 approximately 9 turkeys were seen in the ponderosa pine subtype of the Big Sage-Grassland Habitat Type. On January 22, 4 turkeys were observed in the deciduous shrub subtype of a creek bottom.

In April of 1975 a group of three gobblers was seen in the Canyon Creek lease area on a big sage plateau. In April of 1976, 1 gobbler was seen in the ponderosa pine subtype of the Ponderosa Pine Habitat Type on the King Creek divide of the Ashland lease area.

In May of 1975 four gobblers were seen on a grassland plateau within the Ponderosa Pine Type on the east edge of the Hanging Woman lease area. In May of 1976, four gobblers were seen in a big sage-grassland opening of the Ponderosa Pine Type about 3 miles southwest of the previous years sighting. Also in May of 1976, two gobblers were seen in the same drainage of the Canyon Creek lease area as observed the year before. They were in a grassland park of the Ponderosa Pine Type.

In July of 1975 five gobblers were spotted in the ponderosa pine subtype of the Ponderosa Pine Type on the Custer Forest about two miles west of the Ashland lease area.

In August of 1975, five gobblers and five hens were seen in the ponderosa pine subtype of the Ponderosa Pine Type. They were on the northeast edge of the Hanging Woman lease area.

Food Habits

Wild turkeys use a wide variety of food, including seeds, fruits, berries, leaves and insects. The seeds of ponderosa pine are preferred when available. The fruits and berries of different plants in the diet varied according to difference in annual yields. When available, domestic grain was often utilized in winter. Grass was an important food item at all times, especially during the green and seedhead stage. Of the animal matter included in the diet, grasshoppers were the most important item (Greene and Ellis 1971).

Harvest

During the 1974 hunting season, 604 turkeys were harvested in Fish and Game Region 7 of eastern Montana. Thirteen turkeys were harvested in Rosebud County and 179 in Powder River County. During the fall of 1975, 779 turkeys were harvested in Region 7. Thirty-eight turkeys were shot in Rosebud County and 254 in Powder River County. Hunter success on turkeys in 1973 was 33 percent and in 1974, 42 percent.

In 1974, the young per brood ratio was 5.1, below the long term average of 7.1.

Waterfowl

Ducks and geese use the Tongue River and Reservoir, and stockponds as resting and feeding stops during fall migration. On October 8, 1974, a flight up the Tongue River from Ashland revealed over 200 mallards, 60 teal, 12 gadwalls, 11 mergansers, 80 baldpates, and numerous goldeneyes. The reservoir itself had some 50 redheads, 30 gadwalls, 100 coots, 20 mallards, 45 baldpates, 35 cormorants, 87 Canada geese, 1 snow goose and numerous other ducks that were not identified.

In January 1975, approximately 160 mallards were sighted in the Tongue River canyon. The 10 miles of river below the dam meander through a canyon. This section of the river is used the most heavily by resting and feeding ducks and geese. This is probably due to the relative lack of disturbance, and protection of the canyon walls.

Canada Geese

In the spring of 1974 the Tongue River was flown to determine the number of breeding pairs of Canada geese (*Branta canadensis*). Sixty such pairs were identified.

In May of 1975 the river was flown again including the Tongue River Reservoir. Fifty-seven pairs of geese were identified on the river. This is about the same number as seen in 1974. Besides the breeding pairs of geese, groups of geese totaling 68 birds were also seen. These are either immature birds or unsuccessful breeders. Canada geese usually do not nest until two or three years old. The reservoir had nine pairs of geese concentrated at the upper end in the shallows of the dead cottonwoods.

Altogether 23 goose broods were observed totaling 81 young. This is an average of 3.5 young per brood. This is about the same brood size as found on the Yellowstone River. Average clutch size on the Yellowstone is 5.5 eggs (Hinz 1975). When this survey was conducted some birds were still nesting. The high water may have caused a higher nest loss than usual.

In April of 1976 the river was flown again for breeding pairs of Canada geese, but only from the reservoir to Ashland. From the county bridge on the river above the reservoir to the cottonwoods in the upper end of the reservoir 10 pairs and 4 groups of geese were observed. The four groups of geese totaled 21 birds. The breeding pairs were just about the same as observed in 1975. Seventeen pairs were seen on the river from the dam to Ashland.

Non-Game Wildlife

All observations of each non-game species were combined. Figures 38-42 show distribution of selected species.

Coyotes

Use of Habitat Types

Fall: Coyotes were seen in most habitat types. Forty percent of the observations were in the grassland subtype of the Grassland Habitat Type. Another 24 percent were in alfalfa fields. Twenty percent of the observations were in the big sage-grassland subtype (table 70). Probably the use of forested types has been under-represented due to the difficulty of seeing coyotes in timber.

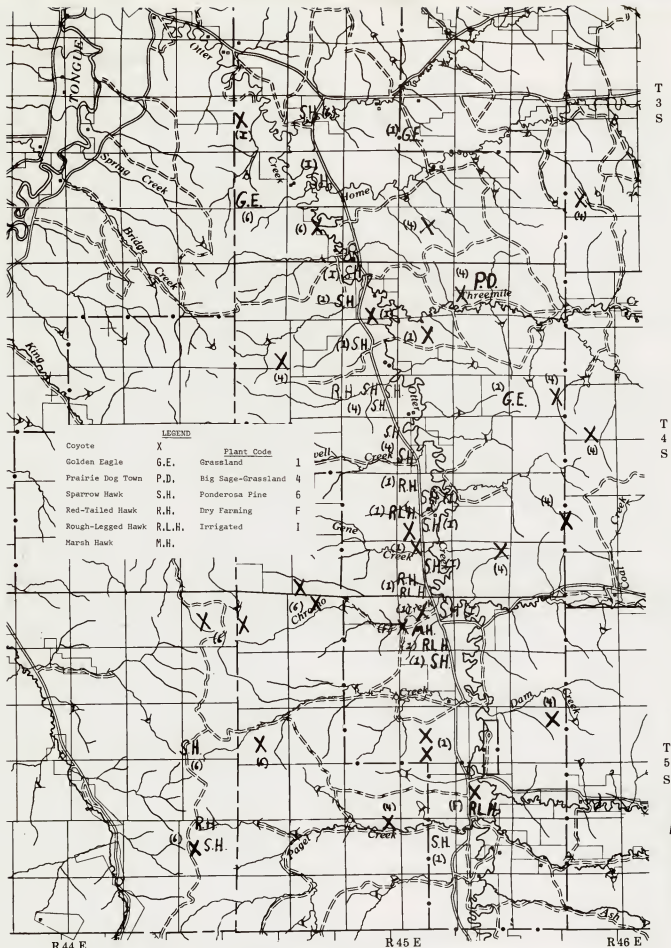


Figure 38. Non-game distribution on the Ashland Coal Lease Area. Numbers in parenthesis are coded habitat types.

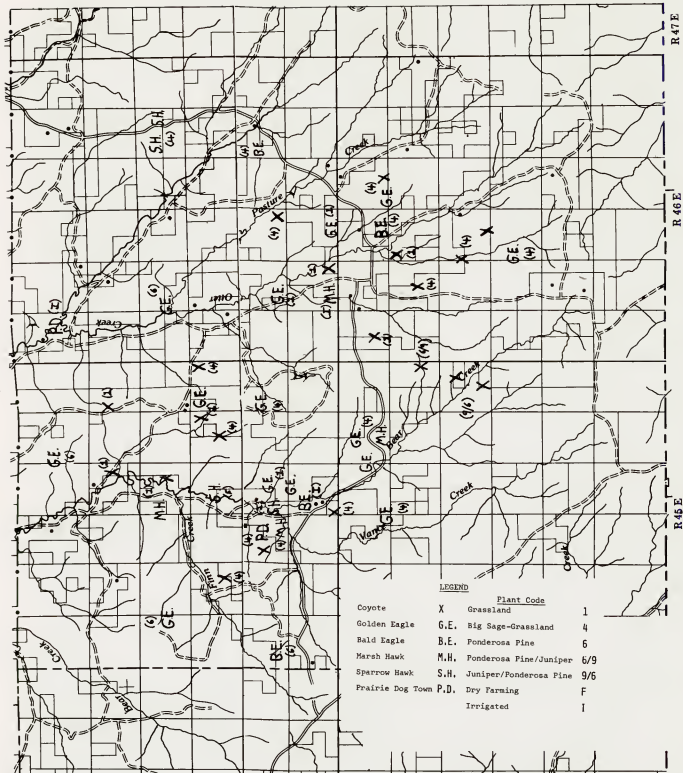


Figure 39. Non-game distribution on the Upper Otter Coal Lease Area. Numbers in parenthesis are coded habitat types.

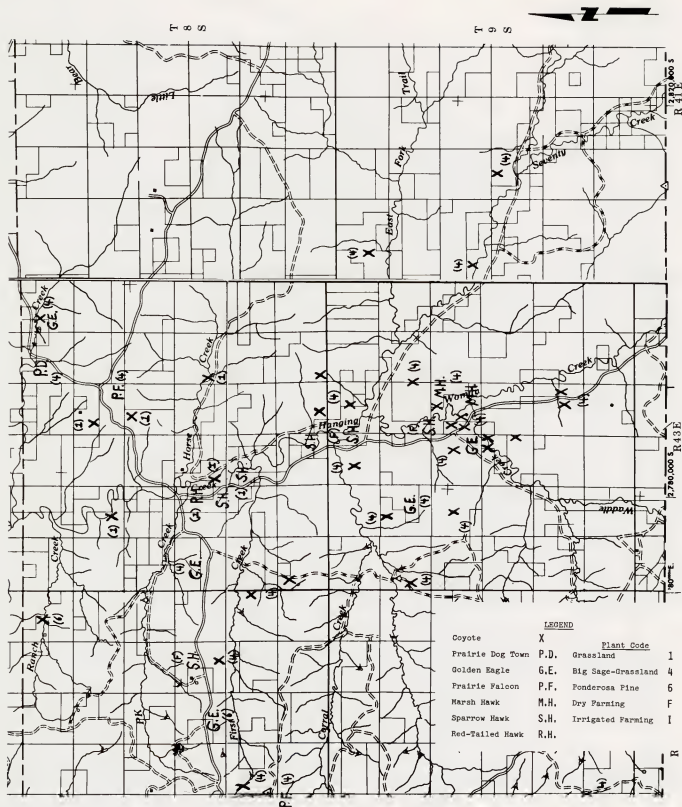


Figure 40. Non-game distribution on the Hanging Woman Coal Lease Area. Numbers in parenthesis are coded habitat types.

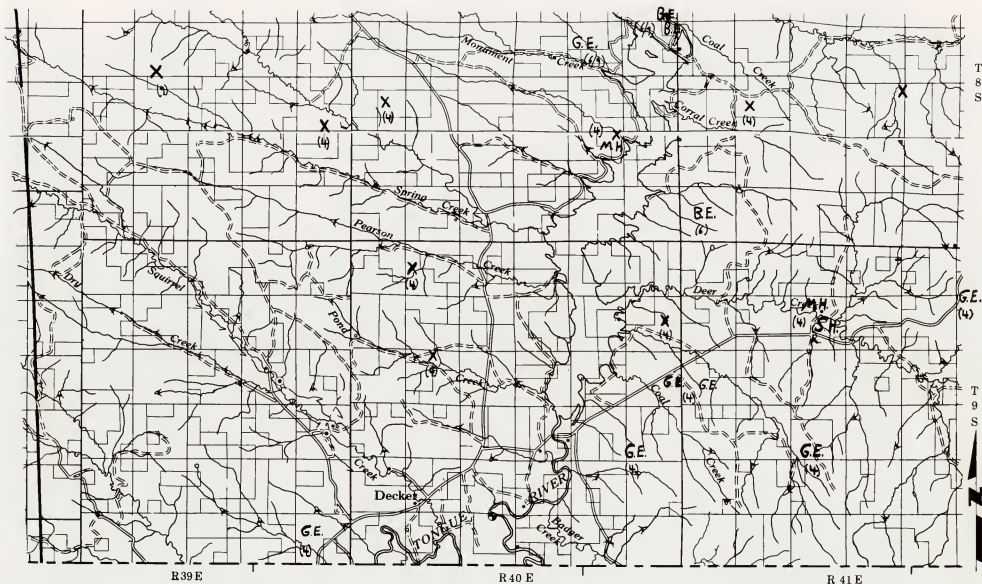


Figure 41. Non-game distribution on the Decker Coal Lease Area. Numbers in parenthesis are coded habitat types.

LEGEND

	<u>Plant Code</u>	
Coyote	X	Big Sage-Grassland
Golden Eagle	G.E.	Ponderosa Pine
Bald Eagle	B.E.	Juniper
Marsh Hawk	M.H.	Ponderosa Pine/Juniper
Sparrow Hawk	S.H.	

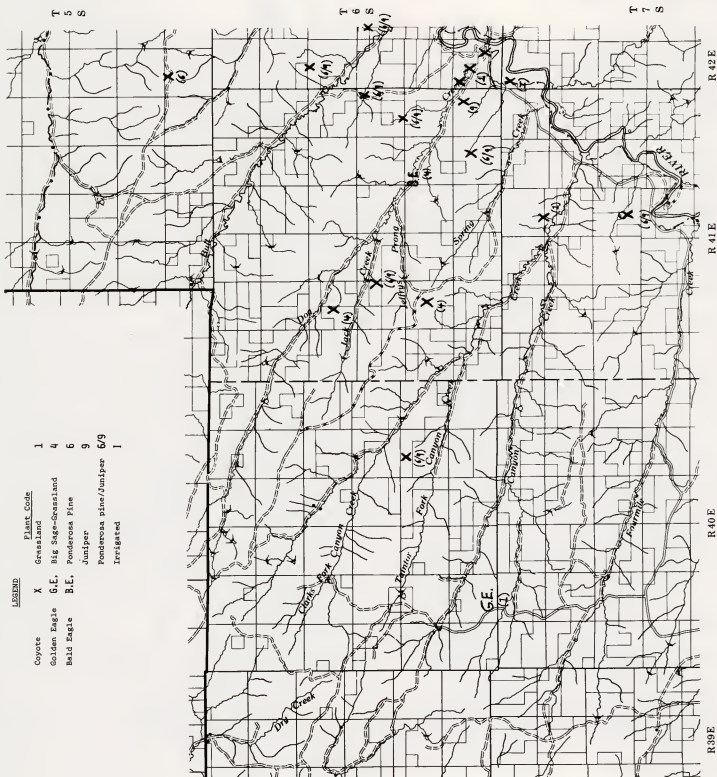


Figure 42. Non-game distribution on the Canyon Creek Coal Lease Area. Numbers in parenthesis are coded habitat types.

Winter: Thirty-six percent of the observations were in the big sage-grassland subtype of the Big Sage-Grassland Habitat Type. Another 19 percent of the observations were in the deciduous shrub subtype. This use of the deciduous shrub type during winter coincides with the use of this subtype by many wildlife species during the cold months, and the presence of dead cattle. Twenty percent of the coyotes were seen in timber types (table 70) (figures 38-42).

Table 70. Seasonal habitat use by coyotes from 105 observations.

Habitat Types	Fall (25) ¹	Winter (80)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	4 ²	8
Grassland Park Subtype		4
Rhus-Grassland Subtype		3
Deciduous Shrub Subtype		14
Big Sage-Grassland Subtype	4	
Ponderosa Pine-Juniper Subtype	8	11
Alfalfa Field Subtype	16	10
Grain Field Subtype	4	
Pasture Subtype		1
Grassland Habitat Type		
Grassland Subtype	40	3
Big Sage-Grassland Subtype	8	
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	8	36
Deciduous Shrub Subtype		5
Alfalfa Field Subtype	8	
Pasture Subtype		5
Ponderosa Pine Subtype		1

¹ Number of coyotes seen

² Percentage of the observations

Golden Eagle

Use of Habitat Types

Fall: Fifty percent of all golden eagle (*Aquila chrysaetos*) observations were in the big sage-grassland subtype. Another 20 percent were in the grassland park subtype of the Ponderosa Pine Habitat Type. The remaining 30 percent were in the ponderosa pine subtype (table 71).

Winter: One-third of the observations were in the big sage-grassland subtype and 21 percent in the grassland subtype. Sixteen percent of the observations in the deciduous shrub subtype and the 11 percent on alfalfa fields were due mainly, I believe, to carrion along these bottomlands (table 71) (figures 38-42).

Table 71. Seasonal habitat use of golden eagles from 29 observations.

Habitat Types	Fall (10) ¹	Winter (19)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	30 ²	16
Grassland Park Subtype	20	
Deciduous Shrub Subtype		11
Big Sage-Grassland Subtype	20	
Alfalfa Field Subtype		11
Grassland Habitat Type		
Grassland Subtype		21
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	30	32
Deciduous Shrub Subtype		5
Ponderosa Pine-Juniper Subtype		5

¹ Number of eagles observed

² Percentage of observations

Bald Eagle

Use of Habitat Types

Fall: All the observations of bald eagles (*Haliaeetus leucocephalus*) were within the Ponderosa Pine Habitat Type, 50 percent in the ponderosa pine subtype and the other 50 percent on the bottomlands, divided among the deciduous shrub subtype and alfalfa fields (table 72).

Winter: During this season 84 percent of the observations were in the deciduous shrub subtype (table 72). This is because bald eagles prefer to winter along waterways and feed on cattle carrion and fish (figures 38-42).

Table 72. Seasonal habitat use of bald eagles from 26 observations.

Habitat Types	Fall (8) ¹	Winter (18)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	50 ²	11
Deciduous Shrub Subtype	37	78
Alfalfa Field Subtype	13	-
Ponderosa Pine-Juniper Subtype		
Big Sage-Grassland Habitat Type		
Deciduous Shrub Subtype		6

¹ Number of eagles observed

² Percent of observations

Osprey

Osprey (*Pandion haliaetus*) live entirely on fish, so they naturally prefer to live in the vicinity of some large body of water. There is an osprey nest at the upper end of the Tongue River Reservoir. As of July 29, 1975 there were three young in the nest.

As of April 24, 1976, the pair of ospreys had returned and were building a new nest close to the old one. Last year's nest was occupied by an incubating Canada goose.

Food Habits

The osprey is not a deep diver and catches only fish that swim on or near the surface or in shallow water. This would be fish like carp that feed in shallows or any fish during spawning which often takes place near shore.

Red-tailed Hawk

In April of 1974 I flew the Tongue River looking for raptor nests. Eighteen hawk nests were located, with 7 of them being between the reservoir and Ashland. Of the 40 observations of redtail hawks (*Buteo jamaicensis*) classified to habitat types, 55 percent were in the Ponderosa Pine Type, 25 percent in the Grassland Type, and 20 percent in the Big Sage-Grassland Type.

American Kestrel

A total of 106 observations of American kestrels (*Falco sparverius*) during the spring, summer and fall were classified to vegetation types. Fifty-two percent of the observations were in the Grassland Habitat Type, most in the grassland subtype, big sage-grassland subtype and the roadside vegetation subtype. Twenty-eight percent of the observations were in the Ponderosa Pine Habitat Type and 22 percent in the Big Sage-Grassland Habitat Type. Twenty-eight percent of the observations were in the grassland subtype and 36 percent in the big sage-grassland subtype. This is obviously a bird of open terrain, but closely associated with woodlands for nesting sites. They nest in holes which may be a natural tree crevice or an old woodpecker hole.

Great Horned Owl

Great horned owls (*Bubo virginianus*) were commonly found nesting in deciduous habitat type, particularly along the Tongue River. A number of nests were located along the Tongue in February and early March 1974. They often use old red-tailed hawk nests.

Songbirds

Bird distribution is presented here according to Skaar's latilongs. "A latilong is defined as the area between lines of latitude and longitude (parallel and meridians)" (Skaar 1975). With this method the state of Montana is divided into 47 latilongs (table 73). The Birney-Decker area is the shaded portion of latilong number 43 (figure 43). Birds which have been sighted in latilong number 43 are listed. This is not a complete list, but is the best available at the present time.

Pinyon Jays (*Cymnorhinus cyanocephalus*)

Use of Habitat Types

Fall: During this season the majority of the observations (65 percent) were in grain fields of the Grassland Habitat Type. Most of the remaining observations were in timber subtypes of the Ponderosa Pine Habitat Type (table 74).

Winter: All observations were in the Ponderosa Pine Habitat Type, 60 percent in the ponderosa pine subtype and 40 percent in alfalfa fields.

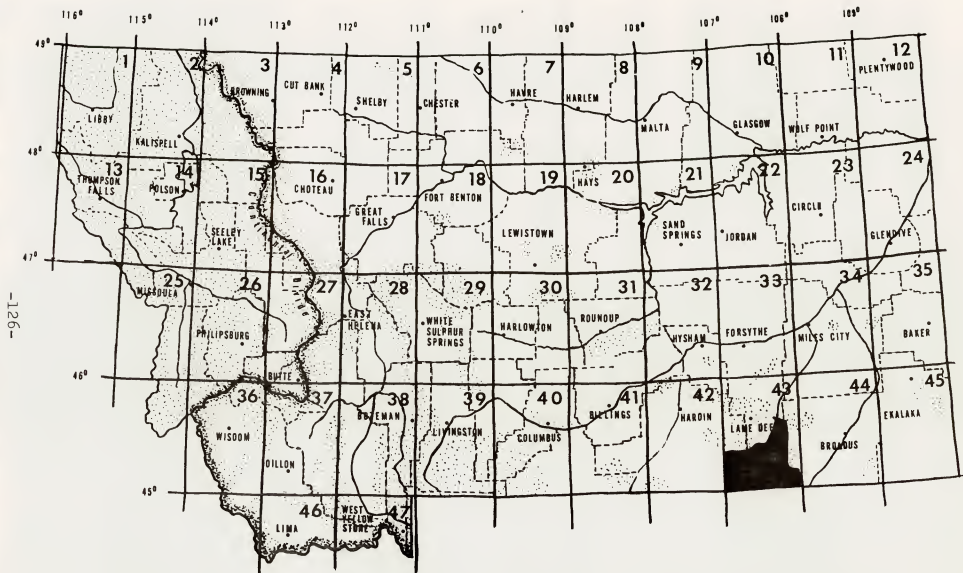


Figure 43. Latilongs of Montana (shaded portion is Birney-Decker Area).

Table 73. Birds found in the Latilong (43) containing the Birney-Decker area.

W= winters in the latilong
B= breeds in the latilong

	1.	Common Loon (<i>Gavia immer</i>)
	2.	Eared Grebe (<i>Podiceps nigricollis</i>)
	3.	Western Grebe (<i>Aechmophorus occidentalis</i>)
	4.	Pied-billed Grebe (<i>Podilymbus podiceps</i>)
	5.	White Pelican (<i>Pelecanus erythrorhynchos</i>)
B	6.	Double-crested Cormorant (<i>Phalacrocorax auritus</i>)
B	7.	Great Blue Heron (<i>Ardea herodias</i>)
	8.	Whistling Swan (<i>Olor columbianus</i>)
W B	9.	Canada Goose (<i>Branta canadensis</i>)
W B	10.	Mallard (<i>Anas platyrhynchos</i>)
	11.	Gadwall (<i>Anas strepera</i>)
	12.	Pintail (<i>Anas acuta</i>)
	13.	Green-winged Teal (<i>Anas crecca</i>)
	14.	Blue-winged Teal (<i>Anas discors</i>)
	15.	American Wigeon (<i>Anas americana</i>)
	16.	Northern Shoveler (<i>Anas clypeata</i>)
	17.	Redhead (<i>Aythya americana</i>)
	18.	Ring-necked Duck (<i>Aythya collaris</i>)
	19.	Canvasback (<i>Aythya valisineria</i>)
	20.	Lesser Scaup (<i>Aythya affinis</i>)
W	21.	Common Goldeneye (<i>Bucephala clangula</i>)
	22.	Ruddy Duck (<i>Oxyura jamaicensis</i>)
W	23.	Common Merganser (<i>Mergus merganser</i>)
	24.	Turkey Vulture (<i>Cathartes aura</i>)
W	25.	Sharp-skinned Hawk (<i>Accipiter striatus</i>)
B	26.	Red-tailed Hawk (<i>Buteo jamaicensis</i>)
	27.	Swainson's Hawk (<i>Buteo swainsoni</i>)
W	28.	Rough-legged Hawk (<i>Buteo lagopus</i>)
	29.	Ferruginous Hawk (<i>Buteo regalis</i>)
W B	30.	Golden Eagle (<i>Aquila chrysaetos</i>)
	31.	Bald Eagle (<i>Haliaeetus leucocephalus</i>)
W	32.	Marsh Hawk (<i>Circus cyaneus</i>)
B	33.	Osprey (<i>Pandion haliaetus</i>)
W	34.	Prairie Falcon (<i>Falco mexicanus</i>)
	35.	Sparrow Hawk (<i>Falco sparverius</i>)
W B	36.	Sharp-tailed Grouse (<i>Pedioecetes phasianellus</i>)
W B	37.	Sage Grouse (<i>Centrocercus urophasianus</i>)
W B	38.	Ring-necked Pheasant (<i>Phasianus colchicus</i>)
W	39.	Gray Partridge (<i>Perdix perdix</i>)
W B	40.	Turkey (<i>Meleagris gallopavo</i>)
	41.	American Coot (<i>Fulica americana</i>)
W B	42.	Killdeer (<i>Charadrius vociferus</i>)
W	43.	Common Snipe (<i>Capella gallinago</i>)
	44.	Long-billed Curlew (<i>Numenius americanus</i>)

Table 73 Continued

	45.	Upland Plover (<i>Bartramia longicauda</i>)
	46.	Spotted Sandpiper (<i>Actitis macularia</i>)
	47.	Greater Yellowlegs (<i>Tringa melanoleuca</i>)
	48.	Lesser Yellowlegs (<i>Tringa flavipes</i>)
	49.	Wilson's Phalarope (<i>Steganopus tricolor</i>)
	50.	Northern Phalarope (<i>Lobipes lobatus</i>)
	51.	Ring-billed Gull (<i>Larus delawarensis</i>)
W	52.	Rock Dove (<i>Columba livia</i>)
B	53.	Mourning Dove (<i>Zenaida macroura</i>)
	54.	Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)
	55.	Black-billed Cuckoo (<i>Coccyzus erythrophthalmus</i>)
	56.	Barn Owl (<i>Tyto alba</i>)
W B	57.	Great Horned Owl (<i>Bubo virginianus</i>)
W	58.	Short-eared Owl (<i>Asio flammeus</i>)
	59.	Saw-whet Owl (<i>Aegolius acadicus</i>)
	60.	Poorwill (<i>Phalaenoptilus nuttallii</i>)
	61.	Common Nighthawk (<i>Chordeiles minor</i>)
	62.	White-throated Swift (<i>Aeronautes saxatilis</i>)
	63.	Belted Kingfisher (<i>Megasceryle alcyon</i>)
W B	64.	Common Flicker (<i>Colaptes auratus</i>)
	65.	Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)
W	66.	Hairy Woodpecker (<i>Dendrocopos villosus</i>)
W	67.	Downy Woodpecker (<i>Dendrocopos pubescens</i>)
W	68.	Black-backed Three-toed Woodpecker (<i>Picoides arcticus</i>)
	69.	Eastern Kingbird (<i>Tyrannus tyrannus</i>)
	70.	Western Kingbird (<i>Tyrannus verticalis</i>)
B	71.	Cassin's Kingbird (<i>Tyrannus vociferans</i>)
	72.	Say's Phoebe (<i>Sayornis saya</i>)
	73.	Least Flycatcher (<i>Empidonax minimus</i>)
	74.	Dusky Flycatcher (<i>Empidonax oberholseri</i>)
	75.	Western Wood Pewee (<i>Contopus sordidulus</i>)
W	76.	Horned Lark (<i>Ememophila alpestris</i>)
	77.	Violet-green Swallow (<i>Tachycineta thalassina</i>)
B	78.	Tree Swallow (<i>Iridoprocne bicolor</i>)
	79.	Bank Swallow (<i>Riparia riparia</i>)
	80.	Rough-winged Swallow (<i>Stelgidopteryx ruficollis</i>)
B	81.	Barn Swallow (<i>Hirundo rustica</i>)
B	82.	Cliff Swallow (<i>Petrochelidon pyrrhonota</i>)
W B	83.	Black-billed Magpie (<i>Pica pica</i>)
W	84.	Common Raven (<i>Corvus corax</i>)
W	85.	Common Crow (<i>Corvus brachyrhynchos</i>)
W	86.	Pinon Jay (<i>Gymnorhinus cyanocephalus</i>)
W	87.	Black-capped Chickadee (<i>Parus atricapillus</i>)
W	88.	White-breasted Nuthatch (<i>Sitta carolinensis</i>)
	89.	Brown Creeper (<i>Certhia familiaris</i>)
	90.	House Wren (<i>Troglodytes aedon</i>)

Table 73 continued

	91.	Long-billed Marsh Wren (<i>Telmatodytes palustris</i>)
	92.	Canon Wren (<i>Catherpes mexicanus</i>)
	93.	Rock Wren (<i>Salpinctes obsoletus</i>)
	94.	Gray Catbird (<i>Dumetella carolinensis</i>)
	95.	Brown Thrasher (<i>Toxostoma rufum</i>)
W B	96.	Robin (<i>Turdus migratorius</i>)
B	97.	Eastern Bluebird (<i>Sialia sialis</i>)
B	98.	Mountain Bluebird (<i>Sialia currucoides</i>)
W	99.	Townsend's Solitaire (<i>Myadestes townsendi</i>)
	100.	Cedar Waxwing (<i>Bobyrcilla cedrorum</i>)
W	101.	Northern Shrike (<i>Lanius excubitor</i>)
	102.	Loggerhead Shrike (<i>Lanius ludovicianus</i>)
W	103.	Starling (<i>Sturnus vulgaris</i>)
	104.	Solitary Vireo (<i>Vireo solitarius</i>)
	105.	Red-eyed Vireo (<i>Vireo olivaceus</i>)
	106.	Warbling Vireo (<i>Vireo gilvus</i>)
B	107.	Yellow Warbler (<i>Dendroica petechia</i>)
	108.	Yellow-rumped Warbler (<i>Dendroica coronata</i>)
	109.	Ovenbird (<i>Seiurus aurocapillus</i>)
	110.	Yellowthroat (<i>Geothlypis trichas</i>)
	111.	Yellow-breasted Chat (<i>Icteria virens</i>)
	112.	American Redstart (<i>Setophaga ruticilla</i>)
W	113.	House Sparrow (<i>Passer domesticus</i>)
W B	114.	Western Meadowlark (<i>Sturnella neglecta</i>)
	115.	Yellow-headed Blackbird (<i>Xanthocephalus xanthocephalus</i>)
W B	116.	Red-winged blackbird (<i>Agelaius phoeniceus</i>)
B	117.	Northern Oriole (<i>Icterus galbula</i>)
W	118.	Brewer's Blackbird (<i>Euphaga cyanocephalus</i>)
B	119.	Common Grackle (<i>Quiscalus quiscula</i>)
	120.	Brown-headed Cowbird (<i>Molothrus ater</i>)
	121.	Western Tanager (<i>Piranga ludoviciana</i>)
	122.	Black-headed Grosbeak (<i>Pheucticus melanocephalus</i>)
	123.	Luzuli Bunting (<i>Passerina amoena</i>)
W	124.	Evening Grosbeak (<i>Hesperiphona vespertina</i>)
W	125.	Gray-crowned Rosy Finch (<i>Leucosticte tephrocotis</i>)
W	126.	Black Rosy Finch (<i>Leucosticte atrata</i>)
	127.	Pine Siskin (<i>Spinus pinus</i>)
W	128.	American Goldfinch (<i>Spinus tristis</i>)
W	129.	Red Crossbill (<i>Loxia curvirostra</i>)
	130.	Rufous-sided Towhee (<i>Pipilo erythrophthalmus</i>)
B	131.	Lark Bunting (<i>Calamospiza melanocorys</i>)
	132.	Grasshopper Sparrow (<i>Ammodramus savannarum</i>)
	133.	Vesper Sparrow (<i>Poocetes gramineus</i>)
B	134.	Lark Sparrow (<i>Chondestes grammacus</i>)
W	135.	Dark-eyed Junco (<i>Junco hyemalis</i>)
W	136.	Tree Sparrow (<i>Spizella arborea</i>)
	137.	Chipping Sparrow (<i>Spizella passerina</i>)
	138.	Clay-colored Sparrow (<i>Spizella pallida</i>)
	139.	Brewer's Sparrow (<i>Spizella breweri</i>)
	140.	Song Sparrow (<i>Melospiza melodia</i>)

Table 74. Seasonal habitat use by pinyon jays from 168 observations.

Habitat Types	Fall '75 (118) ¹	Winter '75-'76 (50)	Spring & Summer '76 (82)
Ponderosa Pine Habitat Type			
Ponderosa Pine Subtype	17 ²	60	15
Big Sage-Grassland Subtype	5	-	-
Ponderosa Pine-Juniper Subtype	13	-	12
Alfalfa Field Subtype	-	40	-
Grassland Habitat Type			
Grain Field Subtype	65	-	-
Ponderosa Pine Subtype	-	-	73

¹ Number of birds observed

² Percent of observations

Spring and Summer: Observations for spring and summer were combined to enlarge the sample size. It is most likely that habitat use would be the same for both seasons since most bird species migrate for the winter and have returned to their brood rearing areas.

All the observations during these seasons were associated with timber. Fifteen percent of the observations were in the ponderosa pine subtype and 12 percent in the ponderosa pine-juniper subtype, both of the Ponderosa Pine Habitat Type. Seventy-three percent of the observations were in the Grassland Habitat Type but in the ponderosa pine subtype (table 74).

Common Redpolls

Common redpolls (*Acanthis flammea*) are winter visitors. Eighty-five percent of the observations were on grasslands. They prefer to feed in weedy, grassy fields.

Black-Capped Chickadees (*Parus articipillus*)

Use of Habitat Types.

Fall: Most of the observations were in the ponderosa pine subtypes of the Big Sage-Grassland Habitat Type (table 75).

Table 75 . Seasonal habitat use by black-capped chickadees from 32 observations.

Habitat Types	Fall (24) ¹	Winter (8)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	4 ²	13
Deciduous Shrub Subtype		87
Big Sage-Grassland Habitat Type		
Ponderosa Pine Subtype	96	

¹ Number of birds observed

² Percent of observations

Winter: During this season the birds had moved to the deciduous shrub subtype. This provides shelter and food throughout the winter (table 75).

Gray-Crowned Rosy Finch (*Leucosticte tephrocotis*)

Forty observations of this bird during winter were in the Ponderosa Pine Subtype of the Ponderosa Pine Type.

Evening Grosbeak (*Hesperiphona vespertina*)

Thirty observations of this bird during winter were in the deciduous shrub subtype of the Ponderosa Pine Habitat Type.

Slate-Colored Juncos (*Junco hyemalis*)

Use of Habitat Types

Fall: Two-thirds of the observations were in the deciduous shrub subtype. One-third of the sightings were in grasslands.

Winter: All the observations this season were confined to the deciduous shrub subtype.

Flicker (*Colaptes* spp.)

Use of Habitat Types

Fall: Sixty percent of the observations were in the ponderosa pine subtype. Another 33 percent were in the grasslands (table 76).

Spring: During spring 78 percent of the observations were in the Ponderosa Pine Habitat Type, and most of this was in the ponderosa pine subtype (table 76). Obviously, the flicker is a bird of the forest. Its favorite nesting sites are old rotten stumps of trees such as cottonwoods, junipers and pines.

Table 76. Seasonal habitat use by flickers from 50 observations.

Habitat Types	Fall 1975 (27) ¹	Spring 1976 (23)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	56 ²	48
Big Sage-Grassland Subtype	4	-
Deciduous Shrub Subtype	-	13
Silver Sage Subtype	-	9
Pasture Subtype	-	4
Grassland Subtype	-	4
Grassland Habitat Type		
Grassland Subtype	33	-
Roadside Vegetation Subtype	4	-
Big Sage-Grassland Subtype	-	4
<i>Rhus</i> -Grassland Subtype	-	4
Big Sage-Grassland Habitat Type		
Ponderosa Pine Subtype	4	-
Big Sage-Grassland Subtype	-	4
Deciduous Shrub Subtype	-	9

¹ Number of birds observed

² Percentage of observations

Meadowlark

Use of Habitat Types

Fall: The meadowlark (*Sturnella neglecta*) is a bird of the grasslands. Ninety-nine percent of the observations were in the Grassland Habitat Type with 72 percent of the total observations in the grassland subtype.

Spring: During this season meadowlarks were spread out into more vegetation communities than in fall. Fifty-three percent of the observations were in the Grassland Habitat Type. Thirty-three percent of the observations were in the big sage-grassland subtype.

Red-Winged Blackbird

Use of Habitat Type

Fall: A group of approximately 350 redwing blackbirds (*Agelaius phoeniceus*) was seen in September 1975 on the grassland subtype of the Grassland Habitat Type. The birds were flocking to prepare for the fall migration.

Spring and Summer: Redwings are a bird of wet marshy areas. Forty-five percent of the observations were in the deciduous shrub subtype and 30 percent in alfalfa fields, yielding together 75 percent of all the observations.

Barn Swallow

Twenty-seven observations of barn swallows (*Hirundo rustica*) were recorded during spring and summer. Forty-four percent of the observations were in the Ponderosa Pine Type, 19 percent in the Grassland Habitat Type and 37 percent in the Big Sage-Grassland Type. But 44 percent of the birds were in the deciduous shrub subtype. Since the barnswallow feeds on insects it usually nests and lives near areas of insect abundance, such as water courses and deciduous shrub.

Cliff Swallow

Sixty-three observations of cliff swallows (*Petrochelidon pyrrhonota*) were recorded. Eighty-five percent of all the observations were in the deciduous shrub subtype. This is at least partially due to the fact that cliffs for nesting are often exposed along waterways, bridges are used for nesting, and insects are most plentiful near water.

Robin

Robins (*Turdus migratorius*) appear to be a bird of the forest margin, sparsely wooded areas and deciduous shrubs. In spring 45 percent of the observations were in the deciduous shrub subtype and 30 percent in the ponderosa pine subtype (table 77).

During summer 44 percent of the observations were in the deciduous shrub and roadside vegetation subtypes, followed by 25 percent in the grassland subtype.

Table 77. Seasonal habitat use by robins from 80 observations.

Habitat Types	Spring (44) ¹	Summer (36)
Ponderosa Pine Habitat Type		
Ponderosa Pine Subtype	30 ²	3
Alfalfa Field Subtype	5	11
Deciduous Shrub Subtype	43	22
Roadside Vegetation Subtype	9	22
Grassland Park Subtype	5	14
Ponderosa Pine-Juniper Subtype		6
Ponderosa Pine-Juniper-Big Sage Subtype		3
Grassland Habitat Type		
Grassland Subtype	-	11
Big Sage-Grassland Subtype	-	3
Greasewood Subtype	-	6
Big Sage-Grassland Habitat Type		
Big Sage-Grassland Subtype	5	
Deciduous Shrub Subtype	2	
Alfalfa Field Subtype	2	

¹ Number of robins observed

² Percent of observations

Yellow Warbler

The yellow warbler (*Dendroica pete chia*) is a bird of streams and willow bottoms. The young eat strictly insects, such as the caterpillars of the gypsy moth, cankerworms, bark beetles, boring beetles, flies, plant lice, grasshoppers, and spiders (Audubon Nature Encyclopedia).

Mourning Dove

The biggest percentage of mourning doves (*Zenaida macroura*) was observed in grain fields, 36 percent. Roadside vegetation accounted for 21 percent of the doves observed. Doves were seen throughout many habitat types.

Killdeer

Sixty-two percent of the killdeer (*Charadrius vociferus*) observations were in the roadside vegetation subtype. Evidently this vegetation is suitable for nesting and feeding.

Black-billed Magpie

From my observations, 62 percent of the black-billed magpie (*pica pica*) were in the Ponderosa Pine Habitat Type and most of these within the ponderosa pine subtype.

Turkey Vulture

About two dozen turkey vultures (*Cathartes aura*) spent the spring and summer along the Tongue River about 2½ miles up river from Birney. They seem to favor one certain bend in the river. Their nesting area has not been located.

The food of the turkey vulture is mainly carrion, but it also eats snakes, toads, mice and occasionally young birds. It finds carrion by its sense of sight, not smell (Pearson 1917).

Double-crested Cormorant

There is a large rookery at the upper end of the Tongue River Reservoir. In the spring of 1975 there were approximately 75 active nests.

The double-crested cormorant (*Phalacrocorax auritus*) lives almost entirely on fish which it captures underwater by swimming with both wings and feet. The young are fed by regurgitation (Pearson 1917).

Great Blue Heron

They nest usually in tall trees along river banks. Like most herons the Great Blue Heron (*Ardea herodias*) is a solitary bird in its habits except during the breeding season. At this

time they show a marked gregarious instinct by forming colonies where they build huge nests and feed their young by regurgitation. Unless the birds are seriously molested they are likely to return in successive years to the same nesting site. There is a large rookery at the upper end of the Tongue River Reservoir containing about 100 active nests. Between the reservoir and Ashland there are three other small rookeries.

Red-headed Woodpecker

The redhead woodpecker (*Melanerpes erythrocephalus*) is generally considered to be a migratory species throughout the northern portion of its breeding range, but its movements seem to depend almost entirely on the quantity of its winter food supply. Montana (Lewistown, Fairview, Terry) is about the northern extension of its breeding range and west to Lewistown, Billings and Kirby (Bent 1939). Several were seen in the Birney-Decker area each spring.

Mountain Bluebird

Of 114 observations, 88 percent were in the Ponderosa Pine Habitat Type. The ponderosa pine-juniper-big sage mix subtype accounted for 47 percent of the total observations and the big sage-grassland subtype accounted for an additional 16 percent (table 78). The mountain bluebird (*Sialia currucoides*) seems to prefer wooded areas with numerous openings.

Table 78. Season habitat use by bluebirds from 114 observations.

Habitat Types	Spring and Summer
Ponderosa Pine Habitat Type	
Ponderosa Pine Subtype	7 ¹
Ponderosa Pine-Juniper-Big Sage Mix Subtype	47
Deciduous Shrub Subtype	9
Grassland Park Subtype	5
Big Sage-Grassland Subtype	16
Roadside Vegetation Subtype	3
Grassland Habitat Type	
Grassland Subtype	9
<u>Rhus</u> -Grassland Subtype	2

¹ Percentage of observations.

Western Kingbird (*Tyrannus verticalis*)

Of 31 observations, 65 percent were in the Ponderosa Pine Type, especially along roadsides and creek bottoms. Thirty percent of the observations were in the grassland type.

Eastern Kingbird (*Tyrannus tyrannus*)

This ecologically similar bird showed much the same preference of habitat types as the western kingbird. Of 51 observations, 50 percent were in the Ponderosa Pine Habitat Type, especially along creek bottoms and alfalfa fields. Thirty percent were in the grassland type. Evidently the eastern and western kingbird utilizes both woods and open spaces, preferring the grassland over sagebrush communities.

Lark Sparrow (*Chondestes grammacus*)

Over half the observations were in the roadside vegetation subtype. This species seems to inhabit the open type vegetation communities.

Lark Bunting (*Calamospiza melanocorys*)

Of 187 recorded observations, 61 percent were in the Big Sage-Grassland Habitat Type and 33 percent in the Grassland Habitat Type. Within these major types, the big sage-grassland subtype, grassland subtype and roadside vegetation subtype are the most utilized. This bird appears to be part of the sagebrush-grassland ecosystem.

Vesper Sparrow (*Poocetes gramineus*)

The vesper sparrow is a bird of the grassland ecosystem. Fifty-two percent of the observations were in the Grassland Habitat Type. Another 21 percent were in the roadside vegetation of the Ponderosa Pine Habitat Type.

DISCUSSION-SUMMARY

The Ashland coal lease area has 3 primary game animals, mule deer, pheasants, and sharptails. Sharptails are found on the grassy flats of Otter Creek during spring and summer. At the present time sharptails are not heavily hunted here, although their populations have been good for the last several years. Six breeding grounds were found within or close to the coal lease area. The grassland flats are necessary for continued sharptail presence in Otter Creek.

Pheasants are generally restricted to the deciduous shrub of the creek bottom. Otter Creek has had a good population of pheasants for many years as generally evidenced by the cock crow count. They are hunted but not heavily. Their continued success will depend on the stability of the deciduous shrub - alfalfa - grain complex.

Mule deer are probably the most hunted game animal in the area. It appears that the mule deer use both the Otter Creek valley floor and the Custer National Forest. In early fall (October) the majority of deer were seen in the Otter Creek valley on the grassland and big sage-grassland uplands. During winter (January) virtually all the deer were in the ponderosa pine of the Custer National Forest. At this time of year the alfalfa fields were not attracting deer into the valley, and there were often windblown bare slopes along the divides. Even though there was some movement to the valley floor to haystacks, deer were most often seen feeding in the ponderosa pine habitat type in small sagebrush flats on plateaus. These trends were the same for the fall and winter of 1974-1975 and 1975-1976.

Trends for the two years differed during spring. During the spring of 1975 most of the deer were seen in the grassland and big sage-grassland areas. During the second spring most deer were in the ponderosa pine cover. This difference may have been largely due to the timing of flights. During the first spring the flight was made in early April, whereas in 1976 the lease area was flown in late May. By the latter part of May the deer may have been distributed on summer range. Also the does were getting ready to fawn and were seen alone or in groups of two and three.

It appears that deer use the coulees and creek bottoms as corridors of travel from the forest to the alfalfa fields. If either the forest or the valley floor received disturbance from a major change in land use a segment of the deer population in this area might be seriously affected.

This population is more available to the general public for recreational purposes because it spends a majority of its time on public land. The forest that this deer herd uses is especially important because its rough breaks provide good security. In the future it will be this rough terrain that will continue to produce deer while the less secure deer habitat may deteriorate. Of course, this secure habitat is insufficient if it does not meet the year round requirements of deer or the nearby land such as the Otter Creek valley floor is not left undisturbed.

The Upper Otter Creek area appears to be good deer habitat with better than average fawn production. It is also productive antelope habitat serving mainly as summer and fall range.

✓ The Hanging Woman lease is the best sage grouse habitat in the Birney-Decker area. It contains the majority of the breeding grounds and winters the majority of the birds. Any good sage grouse habitat today is considered critical due to the rapid destruction of vast acreages of dense sagebrush prairie. Along with the loss of sage grouse habitat would be the loss of antelope range.

Evidently the Hanging Woman area has sagebrush flats that are large enough and sagebrush dense enough to support a fair population of sage grouse. The Upper Otter Creek and Decker areas have a few sage grouse. These areas are not prime sage grouse habitat.

The Hanging Woman area and adjacent country has sharptail breeding grounds densities as high as the Ashland area.

✓ Part of the terrestrial importance of the Decker area lies in the sage grouse breeding ground in the east Decker area, the goose nesting at the upper end of the reservoir, the great blue heron and cormorant rookeries and especially the annual presence of a breeding pair of ospreys.

✓ The Canyon Creek area appears to be a wintering area for mule deer, and a high security area for bucks year round. The adults male:female ratio was 1:1 during fall 1974 and winter 1975. A more normal ratio is 1:4. The northern end of this area is also turkey habitat. Since turkeys seem to have distributed themselves as far as they are going to, most turkey habitat should be considered crucial since there is relatively little additional habitat available.

The question of priority of high security deer habitat versus high production deer habitat should be addressed. Areas such as Canyon Creek may be high security for deer or specifically male deer, but in general do not hold many

deer year round. Other areas, such as part of the Upper Otter Creek lease may not have the security that rough breaks like Canyon Creek provides but are more productive of deer.

A Habitat Preference Index was developed to help determine preference use of habitat types throughout the year. Only the more prominent types could be evaluated quantitatively but certain small habitats showed importance. The Habitat Preference Index can aid those interested in finding critical or limiting habitat in a species life cycle. In this study it was seen that deciduous shrub and silver sage subtypes were highly preferred by mule deer. If a situation arose in which one had the opportunity to develop or improve wildlife habitat, this might be a starting point. Also, this index pointed out the value of the large types like big sage-grassland or ponderosa pine. It shows that even these large types of vast acreages may be preferred and therefore valuable. Or, if not preferred, at least they are used at a rate equal to their availability. This stresses the point that there is very little unused habitat, and that if development comes into an area, there is no place for the wildlife to move into and whatever land is lost is either crucial or substantial wildlife habitat.

The index may also help decide between several areas if it is necessary to sacrifice some to development. The areas with a higher preference rating in conjunction with other factors could be a basis for prohibiting development.

Classification of Coal Lease Area

The U.S. Fish and Wildlife Service has developed some criteria for classifying fish and wildlife values for areas of potential federal coal leases. There are four categories of values for fish and wildlife: (1) critical, (2) high-priority, (3) substantial, and (4) limited. In order to place fish and wildlife in these categories, four criteria were established: (1) status of state or federal endangered species, (2) status of state or federal threatened species, (3) importance of the area for species of high interest, (4) restoration/reclamation/mitigation potential (Appendix, table 2).

Using the data in this report, the Birney-Decker potential coal lease areas and the Tongue River were classified into these categories.

Utilizing the data from this report, the Ashland lease area was classified as Class I, critical wildlife values. Four sharptail breeding grounds exist within the lease area, and two others border the area. Hens often nest within 0.5 mile of the breeding ground and brood range for the first 8 weeks is 0.6 to 1.25 mile from the breeding ground. Otter Creek is excellent pheasant habitat as evidenced by the

continuing high population of pheasants. Some wholly protected raptors would be impacted by development.

Mule deer utilize the grassland, meadows and creek bottoms of Otter Creek from spring through fall. They often use the drainages leading into Otter Creek as lanes of travel. These drainages could be considered "critical corridors of movement." The lease area is bordered on the east and west by documented mule deer winter range.

Turkeys are known to use these same areas on both sides of Otter Creek.

Since the Ashland lease area is bordered by public land the mitigation potential for wildlife in Otter Creek would be virtually zero. This is because activity in the valley would affect forest wildlife which utilize the valley part of the year. The recreation potential of the Custer Forest is high and actual use is beginning to grow, but this recreational use of wildlife will be affected if seasonal habitat of the forest is altered.

The Upper Otter Creek lease area received a Class III rating, substantial wildlife values. The lease area has one known sharptail breeding ground and one sage grouse breeding ground. There are most likely other such grounds within the lease area that were not discovered in this study. There are 2 sharptail grounds within 1.5 miles of the lease area, 1 sage grouse ground 1.0 mile away and another sage grouse ground 1.5 miles from the lease.

The area has good antelope and mule deer populations.

Federal and state protected raptors in the area are red-tailed hawks, rough-legged hawks, kestrel's, golden eagles and wintering bald eagles.

The sagebrush portion, which is the east half of the lease, appears to have good potential for restoration to its present state. This area was classified as substantial rather than high-priority because intensity of use or diversity of high-interest species was not as great as adjacent coal lease areas.

The Hanging Woman lease area was classified as Class II, high-priority wildlife values. There are 3 sharptail breeding grounds within the lease area and 2 others within 1.0 mile of the west side of the area. There is also 1 sage grouse breeding ground in the lease area and 4 other grounds within 3 miles of the lease area on the west side. This area to the west of the lease is the largest known breeding-wintering complex in the

Birney-Decker planning unit. Part of the wintering area is the section of the lease area west of Hanging Woman Creek and south of the Decker-Otter county road.

There are large mule deer and antelope populations inhabiting the area.

Federal and state protected raptors such as red-tailed hawks, kestrels, marsh hawks and golden eagles exist. Prairie falcons have also been observed.

Turkeys use the Ponderosa Pine Habitat of the east half of the lease area. Wild turkeys appear to be a very high-interest species to the public.

Reclamation potential in the sagebrush habitat looks good, but that of the ponderosa pine appears doubtful.

Due mainly to the water related wildlife species such as the cormorant and great blue heron rookeries, the nesting ospreys, and nesting ducks and geese, the Decker lease area would have to be classified as Class II, high-priority wildlife values. All these species are partially or wholly protected by federal and state laws. Restoration of the riparian habitat to guarantee continuance or return of these aquatic nesting birds would be virtually impossible. White pelicans and whistling swans have been observed to stopover on the reservoir in spring staying for a few days up to two weeks. Golden eagles, red-tailed hawks and kestrels use the sagebrush and ponderosa pine-juniper habitat of the lease area.

There is one active sage grouse strutting ground on the Decker east lease which is being studied intensively by Decker Coal Company. Documented evidence of sage grouse nesting in the Decker east lease has been established, with additional grouse nesting 1-3 miles to the south of the lease area.

There is one sharptail breeding ground 1.0 mile south of the Decker east area.

Mule deer and antelope reside throughout the lease area. White-tailed deer are along Tongue River above the reservoir, but their habitat is already being impacted by two new bridges across the river. All this mandates the Decker lease area be classified a Class II - high priority.

Canyon Creek lease area is rough, broken terrain. There are 2 known sharptail breeding grounds within the lease area. This area appears to be a wintering area, based on comparison of all and winter flights checking for mule deer distribution. The ratio of adult males to females was 1:1 which is high for males compared to a more normal ratio of 1:4.

Turkeys inhabit the northern end of the lease area especially upper Cook Creek and Whittaker Creek.

The Canyon Creek lease area with its sandstone cliffs is good bobcat habitat.

Bald eagles are occasionally seen over the area in winter.

With the roughness and variability in the terrain of sandstone and shale cliffs, restoration and reclamation appear unfeasible.

* Due to the above data indicating special importance to mule deer, good habitat for bobcats, at least some use by bald eagles, and the potential reclamation difficulties, this area would have to be classified as Class I, critical wildlife value.

\ The Tongue River, at least from the reservoir to Ashland, should be classified as Class I - critical wildlife values - since the riparian ecosystem holds such a diversity and abundance of wildlife with many species depending on it sometime during the year.

There are at least 17 pair of Canada geese nesting on this section of the river. Ducks, mostly mallards, also nest along the river. Pheasants nest and live year-round along the river. Sharptail grouse winter along the river and ducks winter in the canyon from the reservoir downstream about 10 miles. Bald eagles winter here, golden eagles are here year-round, red-tailed hawks and great horned owls nest in the cottonwoods along the river. There are 3 great blue heron rookeries on this section of river, a summering population of turkey vultures and an occasional osprey is sighted.

Whitetail deer inhabit the river, and along the more brushy portions from Brewster's to Nance's, the population is very good. Mule deer use the river for watering and feed in nearby meadows.

There is an excellent beaver population on the river, some mink, and seemingly plenty of raccoons.

Disturbance of this riparian ecosystem would cause irreparable damage to wildlife habitat.

Special Technique Study for Quantifying Wildlife Resources

Mule Deer - Population Estimate

In an effort to quantify a wildlife species, sections of three lease areas were flown with a helicopter looking for mule deer. The objectives were: (1) to compare effectiveness of helicopter with fixed-wing plane, and (2) to see if a total count of deer could be obtained within a limited area.

A section of the Ashland lease was flown on the west side of Otter Creek from Brian Creek north almost to King Mountain and from the top of the divide east to the edge of the forest (figure 14). On January 22, 1976, I flew this area in a fixed-wing plane. Within the flight block I saw 18 mule deer with most of these deer in openings or on grassy hillsides. On January 28, 1976, I flew this flight block in a helicopter and in the same area I saw 78 mule deer. The day was quite warm, in the 40's, and hardly any deer were in the open. I flushed most of the deer from heavy timber where they may have been seeking shade from direct sunlight. Evidently the noise of the helicopter frightened the deer enough to make them move. I felt there was no way to determine how many of the deer actually present I was seeing. However, I was seeing deer in places where I had not seen them with the fixed-wing, either on January 22, or December 3, 1975 or the preceding winter. Brian Creek and Chromo Creek are good examples. These drainages are rough with heavy timber at their heads, yet with the helicopter we flushed 43 mule deer from these drainage heads.

Although the helicopter was thorough, it was very slow and expensive. But it appears for an area of Ashland's topography and timber cover it is necessary. Even then one cannot determine if all or most of the deer are being observed. The flight block covered was about 18 square miles. The deer seen from the fixed-wing on January 22 yielded a minimum density estimate of one deer per square mile. With the deer count from the helicopter it would be 4.3 deer per square mile.

Of the 18 sections flown about 15 sections were tree covered and this is where the deer were. The rest of the acreage was grassland. If I subtract the grassland acreage and only count the timber type as deer winter range the deer density increases. It would be 1.2 deer per square mile with the fixed-wing and 5.2 deer per square mile with the helicopter.

Looking at topographical maps of the area, I indentified what I thought was similar timber habitat (figure 14). Using

the deer density of 5.2 per square mile, this yields a minimum winter population of 161 mule deer within that designated acreage. One must remember I am only talking about the designated timber areas that are cross-matched in figure 14. It helps perspective when it is realized that during the annual antelope surveys biologists feel they see only about 80 percent of the antelope. To emphasize this point, one afternoon during February 1976 my pilot, Keith Stevens saw 150-200 mule deer between Threemile Creek and Lyon Creek, a distance of about 12 miles. He didn't fly on the west side of Otter Creek. If the deer he saw were all the deer on the east side of Otter Creek, and there were quite probably deer on the west divide of Otter Creek, then my estimate of 161 deer was very low.

The summer range of these deer would include the grassland and alfalfa fields between the timbered divides (figure 14). This almost doubles the acreage, therefore halving the estimated minimum deer density of 5.2 to 2.6 per square mile.

The coal lease area on Threemile and Home Creeks is a different sort of timbered area, not as rugged. Since it appeared to be different from that flown with the helicopter I did not include it in the population estimate.

Parts of the Canyon Creek lease area were flown. Here I did not try to estimate a deer population, but rather determine the effectiveness of the helicopter.

The vegetation cover is sparser than on Otter Creek with a mixture of pine stands, pine and juniper and pure juniper. But the topography is rough with deep cuts, gumbo knolls, and sandstone cliffs. However it appeared much easier to see deer from the helicopter than with a super cub. On December 2, 1975 part of this lease area was flown with a super cub but only 6 mule deer were observed. On December 22, 1975 another effort was made to observe deer but only 7 were spotted. Then on January 27, 1976 part of the lease area (Whittaker and Bull Creeks) were flown with a helicopter, and 48 mule deer were observed. On January 29, 1976 a continuation of this flight was made on Bull Creek and part of Prairie Dog Creek with 30 mule deer being observed. It appeared obvious that we had been missing deer with the fixed-wing plane.

With the relative sparseness of vegetation, at least in places, the helicopter appears to be the perfect tool to look into and around the topographical features of coulees and cliffs. I felt that a thorough survey of the area might allow counting 80-90 percent of the mule deer.

Part of the Upper Otter Creek lease area was also flown with the helicopter. Since most of this is level sagebrush terrain it was soon obvious that the helicopter gave no advantage over the fixed-wing plane.

In summary, it appears that on rolling grassland and sagebrush prairie the helicopter gives us little advantage over the super cub for seeing mule deer.

In the juniper habitat type or relatively sparse pine-juniper type with rough topographic features such as the Canyon Creek coal lease area, the helicopter appears to be a very useful tool for observing mule deer.

In the Ashland lease area with rough topographical features covered with heavy pine stands the helicopter was greatly superior over the super cub for observing mule deer, but one can not tell with any reliability what percentage of the deer he is observing.

A population estimate of mule deer was postulated for the Ashland coal lease area since Ashland is a prime coal leasing area. The deer live mainly on public land, and it is becoming essential to develop such techniques for more refined deer management.

In rough breaks heavily covered with pine, the helicopter must be used to find deer. But it appears that even with a helicopter it is not possible to know what percentage of the deer we are seeing. To predict with any accuracy what percentage of the deer are observable it would be necessary to tag animals and fly the area over a period of time to see what percentage of the tagged animals were observed.

In rugged topography with sparse tree coverage, intensive helicopter suveys could provide a population estimate. However, this would have to be considered a minimum population count and should be carried out under the best viewing conditions, such as clear, sunny days with fresh snow on the ground.

On the sagebrush and grassland prairie a fixed-wing plane would be suitable. Flights should be intensive, i.e. flight lines close together, and probably an area should be flown 2-3 times to account for unknown variables and movements of deer. The same flight conditions as mentioned above should be used and it should be understood that any population estimate would be a conservative, minimum count.

Sharp-tailed Grouse - Population Estimate

The estimation of the size of a population of sharp-tailed grouse proved more complicated than just counting. For years biologists have simply counted the number of displaying males on dancing grounds, and assuming a 50:50 sex ratio, multiplied this figure by 2 to come up with the population segment using the ground in question. However, Rippin and Boag (1974) published research which showed that a non-territorial segment of the male population may exist. They removed territorial males from dancing grounds and found that the vacancies were filled with other birds. This recruitment took place only in early March and had essentially stopped by the first week of April. To make sure that the birds did not come from other dancing grounds the birds on all surrounding grounds were tagged. The majority of the new birds filling the vacancies appeared to be juveniles. Therefore they believe that the birds were recruited from a nonproductive segment of the population that otherwise would have remained nonterritorial and quite possibly undetected.

In the spring of 1976 I trapped and removed sharptails from two dancing grounds to check this theory. One on the Custer Forest near Poker Jim Lookout and one on Chromo Creek in the Otter Creek valley.

The Poker Jim ground had 10 displaying males on March 24. I trapped the ground 4 times in the following month removing a total of 8 birds and banding 5, with 2 additional unbanded males still on the ground. If there was no replacement, after I removed 8 male birds there should have been only 2 left, yet on April 20 there were 7 birds. Therefore there had been a recruitment of 5 birds.

On the Chromo Creek ground on March 25 there were 15 birds. Over the following month I removed 11 birds and banded 11. On April 22 there were 11 banded males on the ground. If there was no recruitment, there should have been only 4 males left. Therefore 7 birds had been recruited.

If nonterritorial males exist generally in populations of sharp-tailed grouse, then estimates of total spring densities, based only on numbers of males attending dancing grounds are unrealistic. Based on the usual counting of displaying males, assuming an even sex ratio would have lead one to believe that about 20 sharptails utilized the Poker Jim ground. But with the recruitment of 5 males this means that about 30 sharptails use the ground. On the Chromo ground the usual method would have lead to

an estimate of 30 birds, but with the recruitment of 7 males this revised the estimate to 44 birds. In both cases there appears to be about 1.5 times more birds using these grounds than realized. However, it must be realized that the nonterritorial segment of the male population could vary greatly depending on the previous years' hatch and survival. This research ended at this point because the project ended, but it may be possible to devise a management tool from this knowledge to more accurately measure sharptail populations.

Reclamation and Revegetation Guidelines

The 1973 Montana Strip-mining and Reclamation Act states, in part, "the operator shall prepare the soil and plant such legumes, grasses, shrubs and trees upon the area of land affected as are necessary to provide a suitable permanent diverse vegetative cover capable of: (a) feeding and withstanding grazing pressure from a quantity and mixture of wildlife and livestock at least comparable to that which the land could have sustained prior to the operation;".

With such a mandate from Montana state law interested parties should seriously consider those plant species and habitat types necessary to wildlife and incorporate them in reclamation efforts.

As can be deduced from habitat use and food habits of many of the wildlife species on the coal lease areas, it appears that diversity will be the key to successful reclamation where wildlife is concerned. This means both a diversity of cover types and a diversity of plant species within each cover type. The creation of a variety of micro-climates through various soil surface manipulations and the use of different soil types will play a large part in reestablishing vegetation diversity.

First priority should be to the establishment of shrub and tree communities since they may be the hardest to establish, and are the most critical for reestablishment of wildlife habitat. Forbs will pioneer on their own to some extent and there is already considerable emphasis on revegetating spoils with grasses.

Since food, shelter and space are the 3 basic ecological requirements of all animal life, this report will concentrate on food and shelter requirements for reclamation guidelines.

Following is a list of plant species considered important to wildlife for food and cover with emphasis on the shrub.

Shrubs and Trees

Rose (*Rosa* spp.)
Snowberry (*Symphoricarpos* spp.)
Skunkbush (*Rhus trilobata*)
Ponderosa Pine (*Pinus ponderosa*)
Chokecherry (*Prunus virginiana*)
Plum (*Prunus americana*)
Hawthorn (*Crataegus* spp.)
Silver sage (*Artemisia cana*)
Silver buffalo berry (*Shepherdia argentea*)
Rubber rabbit brush (*Chrysothamnus nauseosus*)
Big sage (*Artemisia tridentata*)
Green ash
Box elder
Cottonwood (*Populus deltoides*)
Willow (*Salix* spp.)

Forbs

Fringed sage (*Artemisia frigida*)
Wild lettuce (*Actuca serriola*)
Common salsify (*Tragopogon aubius*)
Dandelion (*Taraxacum* spp.)

Grasses

Western wheatgrass (*Agropyron smithii*)
Green needle grass (*Stipa viridula*)
Bluebunch wheatgrass (*Agropyron spicatum*)
Little bluestem (*Andropogon scoparius*)
Idaho fescue (*Festuca Idahoensis*)

Deciduous shrubs appear to be one plant community that is generally in short supply in southeastern Montana. Their establishment would appear to be a boon for many wildlife species.

The above list was compiled from observations of wildlife food habits and habitat use. The food value of the plant species followed by their nesting and shelter use will be summarized here.

Rose is a very important wildlife food. Sharptails use rosehips heavily during fall and winter. Mule deer seek out rose plant during summer and fall. Rose bushes provide escape cover, winter shelter and nesting sites for many songbird species.

Chokecherry, plum and hawthorn are deciduous fruit bearing shrubs that grow in association with rose. Their fleshy fruits are important food sources for many birds

besides sharptails during fall and remain on the bushes throughout the winter.

Snowberry is another deciduous shrub that could be incorporated with the aforementioned shrubs. This species is one of the most important plants in the diet of white-tailed deer. Its berries are favored by sharptails during summer and fall. It may also be used by deer for fawning if there is no denser brush available.

Since the present Montana reclamation law requires returning the land to "approximate original contour" the natural drainages have to be accounted for. For the benefit of birdlife such as sharptails and numerous songbirds these redeveloped drainages should be planted with a combination of rose, plums, chokecherry, hawthorn, and snowberry.

If established over enough landscape deer would also benefit. Mule deer prefer rose and chokecherry. If there are turkeys in the vicinity, they utilize hawthorn thickets for winter habitat.

Skunkbush is probably the single most important plant in the summer and fall diet of mule deer. They eat all parts of the shrub, leaves, twigs and berries. It is high in carbohydrates. It is a widespread plant and might well be considered a bread and butter species. On favorable soil and slope this species should be included in reclamation plantings. Sharptails also feed heavily on the berries during summer and fall.

Ponderosa pine is the upland tree of southeastern Montana. It provides shade from sun, shelter from cold and escape from predators for deer and a number of other species. Its branches provide nesting sites for numerous songbirds and perches for raptors and roosting sites for turkeys. Pine seeds are an important food source for turkeys, sharptails, red squirrels, chipmunks and many other species. This tree's importance to wildlife is obvious and it should be in all reclamation plans where suitable conditions exist.

Silver sage appears to be a very important food to mule deer during certain years in fall and winter. It seems to require more water and different soil than big sage but where applicable this species would add worthwhile diversity.

Silver buffalo berry is not very widespread but might do well if cultivated. It keeps its berries throughout the winter and the berries maintain their nutrition. This shrub would enhance habitat for sharptails, as well as other bird species.

Rubber rabbitbrush is an important fall and winter food for mule deer. It appears to be another bread and butter food.

Big sagebrush is a very important species for many forms of wildlife. It is winter forage for mule deer and antelope. It is critical for antelope winter survival. It is also critical for year round survival of sage grouse. Sharptails appear to feed in sagebrush areas quite regularly in winter and eat galls that grow on it. Big sagebrush is without a doubt a major wildlife plant.

Fringed sage is an important summer food item for antelope. Good summer antelope range has a plentiful supply of this species.

Wild lettuce and common salsify are two forbs preferred by mule deer. Both species are succulent. Sharptails also prefer wild lettuce.

Dandelion is another species that is heavily consumed by sharptails. It appears to stay green from earliest spring through early winter.

Sharptails are known to feed on the seed heads of grasses such as mentioned on the list. Turkeys also eat grass seed heads and leaves. They can make up a substantial part of their diet. The grass community also provides the insect life for these game birds as well as many songbirds. Grasshoppers provide a major source of protein for young sharptails, turkeys, huns, sage grouse and pheasants.

Where rugged terrain such as sandstone outcroppings, cliffs or other such physical features exist in a lease area, they should not be disturbed because they are important to many wildlife species and cannot be recreated in the reclamation process. This should also be done in areas where ponderosa pine cover is sparse because chances of reestablishing pine seem to be limited.

One method to insure diversity on reclaimed areas would be to incorporate into the mining plans strips or blocks of land that would remain untouched. This would insure some diversity and might also aid in the invasion of native forbs and shrubs onto reclaimed areas if suitable establishment conditions exist.

Water retention reservoirs should be established in reconstructed drainageways to aid in the reestablishment of plant community diversity. This would create the opportunity for more mesic communities as well as provide habitat for more aquatic related wildlife species.

Suggested Procedures for Mitigating Wildlife Losses Through Surface Mining.

- (1) All lands owned by coal companies or where companies have leased federal coal should be open for hunting in areas that will not interfere with the mining operation. This compensates the public for loss of other wildlife habitat by opening wildlife habitat to recreational use that may have been closed. This would enhance the value of such wildlife ecosystems from esthetic and existence values to a recreational one as well.
- (2) Reclamation efforts should actively consider and use plant species essential for wildlife.
- (3) Coal companies and BLM should fund wildlife studies before, during, and after coal leasing and/or mining since the wildlife resource constantly fluctuates and differs with each locality. These studies are necessary to determine local mitigation procedures and to further work on methods of better quantifying populations of individual species.
- (4) At active mines, ponds should be established if water is discovered in the process of mining. These would not be pit ponds, but would have easily accessible shorelines and be sloped to allow vegetation to establish itself. These ponds should be fit for fish and with an irregular shoreline to produce waterfowl habitat.
- (5) In recontouring spoils, the drainage ways should be specifically planted with shrub species (see Reclamation and Revegetation Guidelines).
- (6) Mines adjacent to rivers should carry on activities similar to Decker Coal Company - impound a slough to make a spawning ground for fish (ex. northern pike) and build islands for duck and goose nesting.

- (7) Some lands owned by coal companies should be managed for optimum wildlife habitat in order to provide more wildlife for a number of years and as an experiment to see what is most critical for rehabilitation of those lands after mining. This could either be open to public hunting or managed as a wildlife refuge.

References to Other Wildlife Studies

Several other wildlife studies are being carried on within the Birney-Decker area.

The Montana Department of Fish and Game and the U.S. Fish and Wildlife Service are cooperating with Decker coal company in a study of the fisheries and limnology of the Tongue River Reservoir.

The U.S. Fish and Wildlife Service is studying game animals in Montana around the Decker Mine and also in Wyoming. At least one part of their study is to tag deer and antelope and follow movements of these animals.

Dr. Robert Eng of M.S.U. had a research project on sage grouse sponsored by Decker Coal. Birds were tagged and six were radioed to find location of nesting areas. With plane flights we located breeding and wintering grounds. The objective is to monitor the effects of strip-mining on a sage grouse strutting ground.

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APPENDIX



Appendix,

Table 1. Temperature and precipitation for May - October, 1974-1976.

	May 1-10			Jun 1-10			July 1-10			August 1-10			Sept. 1-10			Oct. 1-10		
	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.
	Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.	
1974	74°	35°	0.18"	72°	41°	1.06"	93°	52°	2.00"	86°	47°	0.12"	78°	40°	0.97"	72°	32°	0.40"
1975	62°	35°	1.34"	72°	42°	0.91"	90°	56°	0.31"	90°	47°	0.04"	85°	36°	0.05"	-	-	-
1976	73°	35°	0.58"	88°	49°	1.33"	92°	53°	0.03"	91°	50°	0.03"	-	-	-	-	-	-
	May 11-20			Jun 11-20			July 11-20			August 11-20			Sept. 11-20			Oct. 11-20		
	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.
	Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.	
1974	63°	35°	0.90"	89°	47°	0.04"	95°	53°	0.57"	85°	46°	0.30"	74°	37°	0.35"	73°	31°	0
1975	73°	40°	0.02"	74°	43°	2.13"	90°	51°	0.19"	85°	46°	0.28"	76°	38°	0.10"	-	-	-
1976	75°	40°	0.58"	76°	47°	2.12"	93°	54°	0.71"	93°	48°	0	-	-	-	-	-	-
	May 21-30			Jun 21-30			July 21-30			August 21-30			Sept. 21-30			Oct. 21-30		
	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.	Ave. Temp.		Total Precip.
	Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.	
1974	75°	44°	1.29"	93°	51°	0.14"	94°	53°	0.13"	83°	45°	0.12"	77°	29°	0.30"	68°	27°	1.77"
1975	64°	34°	1.46"	86°	48°	0.47"	95°	53°	0.26"	88°	43°	0.02"	77°	31°	0	-	-	-
1976	76°	41°	0.37"	-	-	-	94°	54°	0.36"	88°	45°	0.24"	-	-	-	-	-	-

Appendix Table 2

CRITERIA FOR CLASSIFYING FISH AND WILDLIFE VALUES FOR AREAS OF POTENTIAL FEDERAL COAL LEASES

In considering a relative value classification scheme for fish and wildlife, several assumptions must be agreed upon. First, in such a "first-cut" system decisions are not cast in concrete - allocation of a given land unit to one category or another must always be subject to modification by new information. Second, the overall scheme must be applicable to all aquatic, water-dependent, and terrestrial species with some provisions for incomplete knowledge of a site. Third, the criteria used to distinguish between classifications must be logically and operationally defensible, with both flexibility and coherence preserved between states.

With these constraints in mind a scheme of four value classifications, based on four major criteria, is proposed as a working model. The four fish and wildlife value classifications are as follows:

- I. Critical Fish and/or Wildlife Values
- II. High-Priority Fish and/or Wildlife Values
- III. Substantial Fish and/or Wildlife Values
- IV. Limited Fish and/or Wildlife Values

Areas placed in class I would not be recommended for any surface disturbances; areas placed in class IV would be nominated for leasing first. Classes II and III would be recommended for leasing only after site-specific protective stipulations had been formulated. The four major criteria for each of these classifications are: (1) status of endangered species; (2) status of threatened species; (3) importance to species of high interest; and (4) restoration, rehabilitation, or mitigation potential. These four criteria are specified below by proposed factors that relate to each value classification.

1. Status of State or Federal endangered species.

- I. Critical Fish and Wildlife Values. Documented occurrence at the present time, or in the past, for any state or federally chartered endangered species, qualifies land and water to be classified into this category. "Documented," in this context, implies that legally defensible information exists to demonstrate the presence of a particular species. This information could be published reports or field notes of local state personnel; however, the context is that of being able to

"prove" the occurrence in the present with a very high probability of going to the site and with the appropriate techniques demonstrating the actual existence of the species.

- II. High-Priority Fish and Wildlife Values. Under this category the potential occurrence of an endangered species on the land and water is based on professional judgment of personnel familiar with the site. It is differentiated from class I by the fact that unconfirmed reports of the occurrence of an endangered species (past or present) may be available for the area in question; however, the evidence would not be legally defensible. "Potential," in this context, does not necessarily imply that there is a possibility of introduction of the species in question into this area.
 - III. Substantial Wildlife Values. The absence of any endangered species would be the criterion for determination under this category.
 - IV. Limited Fish and Wildlife Values. The absence of any endangered species would qualify land or water to fall into this category as well.
2. Status of State or Federal Threatened species.
- I. Critical Fish and Wildlife Values. The documented present occurrence of a state or federally chartered threatened species would qualify a land or water area for this class (see the definition of documented present occurrence under Status of Endangered Species).
 - II. High-Priority Fish and Wildlife Values. The documented past occurrence of a threatened species would qualify the site under this category (see definition of documented past occurrence under Status of Endangered Species).
 - III. Substantial Fish and Wildlife Values. The potential occurrence (as defined above for endangered species) is the decision criterion for this class.
 - IV. Limited Fish and Wildlife Values. The absence of any threatened species on the site under consideration places the site under this classification.

3. Importance of species of high interest.

This criterion must be defined by each state; although the actual species may differ from state to state, the process of definition must remain compatible. Some suggested components of definition must remain compatible. Some suggested components of this definition are: (1) economically important species (from both consumptive and non-consumptive perspectives); (2) species of special esthetic, scientific, or educational significance (such as raptors, state animals or plants, or fully protected species). Once the array of species defined as "high interest" is established, the classification factor is in terms of biological importance for these species; sensitive areas, intensive-use areas, existence areas, and occasional or absent from areas. Each of these criterion components is discussed below by fish and wildlife value classification unit.

- I. Critical Fish and Wildlife Values. If this area (land and/or water) represents a "sensitive area" for any population of a species which has been defined by the state as a high-interest species, the area would qualify under class I. A biologically sensitive area can be defined as a critical seasonal area. Examples are critical portions of deer or elk winter range, critical corridors for movement between areas (such as strutting grounds, fawning or calving grounds, or spawning sites). In addition, assemblages of species or ecological units that represent unique esthetic, scientific, or educational values may be classed as critical by a state.
- II. High-Priority Fish and Wildlife Values. If the land or water area can be defined as an "intensive-use area" for one or more species of high interest, it qualifies for this classification. An intensive-use area might be deer winter range, an important feeding area for raptors, an area of high animal densities, or any other area that has a intensive biological use for a species of high interest. Alternatively, "intensive use" of an area may be evidenced by very high species diversity.

The intensive-use area might be equivalent to the boundaries drawn for deer winter range within a BLM planning unit, as opposed to critical deer winter range (a subset of the total winter range) as defined above as a sensitive area.

- III. Substantial Fish and Wildlife Values. If the land or water area in question is categorized as an "existence area" for a species of high interest, it would fall into this category. "Existence area," in this context, means the documented occurrence on a regular basis for a species of high interest. It implies a lower intensity of biological use than in class II.

Perhaps classifications will be made upon species that do not represent singly the high economic values or high public interest in many species upon which we have more complete information. A group of species (such as raptors) might well fall under this kind of existence area classification where broad boundaries for feeding and nesting areas might be defined.

- IV. Limited Fish and Wildlife Values. If a species of high interest is either absent or only occasional (sporadic or unpredictable) in its occurrence in the area, then the classification in this category would be appropriate.

4. Restoration/Reclamation/Mitigation Potential.

- I. Critical Fish and Wildlife Values. This class is designed to make some judgments about the terrestrial or aquatic habitat itself. It emphasizes the state-of-the-art technology for restoration, reclamation, or mitigation. Hence, as these technologies progress, reclassification within this criterion may occur. The criterion of consideration implies that there is a very low or essentially zero potential for restoration of the site to its present species composition and productivity. Furthermore, no acceptable mitigation options are available to compensate for the loss of this habitat at the present time. The habitat composition of the site is judged to be extremely intolerant to removal from its current status for any period of time. There are compelling fish or wildlife management considerations that dictate that no disturbance could be tolerated by the members of the ecological assemblage present on the site.

- II. High-Priority Fish and Wildlife Values. A low potential for restoration to present species composition and productivity exists; however,

acceptable mitigation options can be defined for the interim of exploitation activities. The area is judged to be "highly sensitive" to surface disturbance. Professional opinion is that surface-mining activities in particular could cause significant, probably irreversible, changes in the species composition or productivity of the area.

- III. Substantial Fish and Wildlife Values. A moderate potential exists for either restoration of the habitat to its previous composition and productivity or rehabilitation to an equal or greater wildlife or fishery value. In addition, acceptable permanent mitigation options are definable. The area is judged by professional opinion to be moderately sensitive to surface disturbance; further, there is a fifty-fifty probability that it can be restored to a similar species composition or productivity similar to what existed prior to mining.
- IV. Limited Fish and Wildlife Values. Existing habitat conditions support limited fish and wildlife populations. Current technology allows the area to be reclaimed to at least an equal level of fish and wildlife productivity to that existing prior to mining. Acceptable mitigation options are identified.



Appendix Figure 1. Fish and Game Region Seven.





